FORESTRY ABSTRACTS

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TERMITES, SOIL AND VEGETATION*

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Wherever they occur, termites are generally regarded as serious pests, but the emphasis is on damage to timber and cellulose products rather than on soil and living plants, and this emphasis is reflected in termite literature [17, 24]. Agreement about damage to living plants and timber is in most cases clear, but there is evidence of conflicting opinion about termites in relation to soil fertility. At the Fourth Imperial Entomological Conference, 1935, it was decided to collect information about termite damage, and a questionnaire was therefore sent out to all Commonwealth countries. In addition to questions concerning damage to timber and buildings, three questions dealt with damage to soil humus, growing crops and forest trees. Replies were received from 36 countries, but the outbreak of the 1939 war prevented further action until the Fifth Commonwealth Entomological Conference, 1948, for which these replies were condensed and reviewed [23]. It was obvious from this review that very little was generally known about termites in relation to soil and humus, and information on their status as pests of growing crops and trees proved to be scanty and vague. The position was summarized in the printed report of the 1948 Conference as follows:—

'(*a*) *Humus in soil.* Extremely little is known about this probably very important subject. In many countries its importance is recognized, but no research has been conducted except in Australia. The general tendency is to assume that termites are harmful because they devour dead vegetation on the surface of the soil, but in a few replies to the questionnaire, notably those from Australia, British Honduras, Sarawak, Somaliland, Tanganyika and Trinidad, there are indications, and in some cases definite statements, that the attack on humus is beneficial, at least in certain circumstances. The possibility that the insects are beneficial by breaking down fellings and leaf litter in forests is recognized in British Honduras and Sarawak. In Australia, certain species are definitely considered to be beneficial because much organic material is taken into their underground galleries. An interesting observation in Somaliland is that "ant hills" are numerous where grazing is good, but no opinion is expressed as to whether the converse applies.

The part played by termites in aerating the soil and influencing its chemical composition in areas where the nests of subterranean species are abundant, as in parts of Africa and Australia, is almost unknown. All that can be said at present is that it is rash to assume that termites are harmful because they devour humus.

(*b*) *Growing crops.* Many different opinions are given under this heading. In Nyasaland, Nigeria and Tanganyika, growing plants of various annual crops are damaged, but only sporadically so that the total damage is not serious. A note to the effect that damage to crops is not serious if the soil is well tilled comes from Somaliland. In Malaya there are numerous isolated records of damage to many annual and permanent crops, but this is secondary, following injury or adverse conditions; a similar state of affairs is recorded in the Gold Coast. Seedlings of Oil Palm, Coconut, Citrus, etc. in nursery beds, are badly attacked in Sierra Leone, mainly after transplanting (which suggests temporary lack of vigour in the plants), and rice and groundnuts are stated to be sometimes seriously damaged in the field there. Clove and Coconut estates in Zanzibar suffer 50% loss of

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seedlings after transplanting. Sugar-cane is damaged, though negligibly on the whole, in Australia, but in some sugar-growing islands of the West Indies, notably Barbados (and not Trinidad or Jamaica), damage to this crop is certainly not negligible and is sufficient to cause planters to destroy the nests regularly. The only country to record serious damage to a particular crop is Ceylon, where tea is so badly attacked locally, mainly by dry-wood species of termites, that the bushes are eventually killed and at least one estate had to be abandoned, while another reported 80% of the bushes attacked; there is no evidence that damage to tea is secondary. Rubber also is damaged in Ceylon, and also in Sarawak, but in these cases the attack is secondary, following wounds, though attacked trees are otherwise healthy.

In general, it may be concluded that damage to growing crops is not serious, provided the plants are healthy and vigorous, though there are apparently a few exceptions to this.

(*c*) *Forest trees.* Most countries have little or nothing to contribute under this heading, but *Eucalyptus* forests are seriously damaged by several species in Australia. Northern Rhodesia, Nyasaland and Sierra Leone record that damage to growing, indigenous trees is rare and only secondary, but in the first two of these countries, introduced trees, especially *Eucalyptus* spp., are susceptible, and in Nyasaland, Eucalypts are so severely attacked that afforestation is seldom attempted in termite areas, and this is a serious disadvantage. In British Honduras, termites are a major pest of Mahogany and Pine, the former being damaged to an extent estimated at more than 4% by value; Pine is attacked after damage by fire, and these two factors together cause an annual loss in Pine of $60,000.

Several countries admit lack of adequate observations on the activities of termites in indigenous trees, so that lack of records does not necessarily mean that no damage is done. Nevertheless, it is fairly certain that indigenous trees, if healthy, suffer little damage in the Commonwealth as a whole.'

In appraising the value of this survey it has to be realized that very few of the countries had an entomologist to answer the questionnaire and that in many cases replies were necessarily based on sketchy observation. Literature on the subject of termites in relation to soil and vegetation is by no means conclusive in its findings, but it is evident that in some countries termites have an important economic bearing on agriculture and tree culture. Some observers are of the opinion that soil-nesting termites perform a useful function. This theory was first advanced by Henry Drummond [7] in his books on travels in Nyasaland and Northern Rhodesia. Inspired by Darwin's *Vegetable Mould and Earthworms*, Drummond pointed out that termites are responsible for continuous soil circulation in the tropics and that this process promotes soil fertility. This appears to be too easy a generalization, and overlooks the food and habit differences of the numerous species of soil-dwelling termites. Other factors to be taken into account are ecological disturbances due to man's activities: thus dense tropical rain forest can apparently support indefinitely a termite population which presumably is a non-injurious factor of the natural soil/vegetation climax. But if the forest is cleared and the soil is used for food cropping, the availability of humus and cellulose for termites will be seriously depleted and soil deterioration is likely to set in. In the same way, if natural pastures are overgrazed, the humus in the soil may then become insufficient to support its normal termite population, which turns to the living grass and destroys it utterly.

Termites and the Soil

Habitat and nesting habits. Termites occur throughout the tropics, sub-tropics, and even in parts of the northern and southern temperate zones. There are approximately 2,000 species, and Adamson [1] makes broad ecological groups as follows:—

1. Dry-wood termites which live exclusively in wood—the *Kalotermitidae.*
2. Soil-dwellers—the *Mastotermitidae, Hodotermitidae, Rhinotermitidae,* and *Termitidae.*

Group 2 he subdivides as:—

2(*a*) Exclusively subterranean, coming above the surface only during the brief nuptial flight of the young reproductives. There are many species in this group, particularly of the genus *Anoplotermes*, in Trinidad, and some occur in great numbers in forest soils. It is presumed that they have

considerable influence on soil fertility owing to the extent of their subterranean passages and the amount of soil ingested. Unfortunately their biology has received little attention and their occurrence and importance in other countries have not been recorded.

2(*b*) These build exposed nests either of the mound type on the ground or the arboreal type in trees and shrubs. Mound nests range in size from small surface protuberances, a few inches high, to spectacular edifices over 20 ft. high and containing many tons of soil. The arboreal nests are comparatively small, not more than a few feet in diameter. Termites that build exposed nests, enter the ground for building material, food and moisture, and many species of this type construct extensive systems of earthen tunnels leading to dead wood and plant remains which they sometimes plaster extensively with earth. Where they are abundant, these termites transfer large quantities of soil from below to above ground surface.

2(*c*) These have subterranean nests, but seek food above the ground. They move and work under cover of earthen tunnels, for building which they transfer soil from below the ground; soil is also brought up by some species for lining or filling the galleries excavated in the wood on which they feed.

Apparently few detailed observations have been made about depths of workings. Adamson[1] states that in Trinidad forests termites are most abundant in the top 6 in. of soil, where the organic content is high, and he presumes that in drier regions termites seek water at considerable depths. Kalshoven [16] records that in the East Indies termites seek groundwater at a depth of 4 metres. Coaton[4] records the chamber of the African harvester termite (*Hodotermes mossambicus*) some 20 ft. below the surface. Harris [10] points out that in Africa the region south of the Sahara has the largest number of termite species of any of the major geographical zones, and that that region is the home of the fungus-growing termites. These provide exclusively the large mounds which are so typical of tropical Africa outside the rain-forest belt. In Australia, on the other hand, mound-building termites are non-fungus-growers; these, in Africa, build only low hummocks in seasonal swamps and grassland. In America, mound building is on a reduced scale and fungus-growing is non-existent.

Food habits: Much has yet to be learned about the feeding habits of termites, but it is known that termites live on cellulose which they derive from timber, vegetation and humus. Kofoid [17] and Snyder [24] deal at some length with digestive processes, kinds of food, and economic consequences. Adamson [1] distinguishes the following kinds of food:—(i) *Living wood*. Relatively few termites attack living wood, but species of *Coptotermes* damage Rubber, Teak and Tea. The attack is usually, if not always, secondary, starting in dead tissues. (ii) *Living grass and other herbs*. In Africa and Asia, harvester termites, mostly of the genus *Hodotermes*, collect living grass, which they store in their subterranean galleries. (iii) *Sound, dead wood*. This is the chief diet of the *Kalotermitidae*, *Rhinotermitidae* and many of the *Termitidae*, although they feed also on rotting wood. While the heartwood of some tree species is resistant, the sapwood of all species is susceptible. No species of timber is completely immune, and comparatively few are very resistant, to termite attack. (iv) *Rotting wood*. Wood in various stages of decay is subject to attack by most termites, and many species, particularly of the *Termitidae* group, apparently feed only after fungal decay is well advanced. (v) *Dead leaves, herbaceous stems, etc.* Adamson points out that the extent to which these are consumed cannot be readily estimated, but that in parts of Africa and Asia, herbaceous vegetable remains may be rapidly removed by foraging termites. Termites feed inside fibrous stems and petioles, but in general dead leaves are not eaten until they have reached the humus condition. There is little information to indicate the extent to which dead vegetation, other than woody tissues, is eaten. (vi) *Humus*. Although decaying vegetation is the staple diet of most termites, there is no precise information on the state of decay beyond which it ceases to serve as termite food. Kalshoven [16] states that some species of *Capritermes* appear to feed wholly on humus, and Corbett and Miller [6] write that the food of the subterranean *Termes javanicus* is presumably 'rotting organic matter in the soil'. Hegh [11] quotes Fuller's belief that *Cubitermes bilobatus* feeds like an earthworm on soil full of humus. Adamson [1] is of the opinion that a majority of the *Termitidae* in Trinidad feed largely or partly on organic matter which has been incorporated into the soil, and that it is likely

that the same is true in many other parts of the tropics. He considers that wherever termites of this habit occur in large numbers, they must bring about great changes in the physical and chemical nature of the soil. (vii) *Fungi cultivated in 'fungus gardens'*. The nests of many tropical termites, mound and subterranean, contain 'fungus gardens'. The fungi grow on a substratum of what appears to be vegetable remains such as comminuted wood. It is generally accepted that the termites eat portions of the fungi, but Bathellier [2], Grassé [8] and Heim [12], believe that the gardens serve as nurseries for the young termites, and that the fungi are incidental and not cultivated as an important item in the termites' diet.

Lignin appears to be unaffected by termite digestive juices and it can be assumed that faecal lignin is an important constituent of termites' building materials.

According to Harris [10], although termites can undoubtedly dispose of plant residues, they carry the process too far to be of ultimate benefit to the soil. Fungus-growers collect undecomposed woody material over a wide area and concentrate it in their nests in the form of fungus gardens. This material is removed out of range of smaller organisms and analysis of mounds has so far failed to show any increase in soil fertility as a result of the use of so much plant material.

Building materials.

In discussing termite constructions Adamson [1] points out that the principal constituent is soil, mixed with such organic matter as termite faeces, masticated plant remains, and saliva. Few analyses of the material in termite nests have been made, but Holdaway [13], and Cohen [5] have studied that of the mounds of the Australian *Eutermes* (*Nasutitermes*) *exitiosus*.

The relative fertility of abandoned termite mounds has received much attention, and opinions are conflicting. Adamson summarizes the position as follows: In parts of Africa certain types of vegetation develop only on the sites of large mounds. It is commonly assumed that termite mounds are rich in organic matter, and though this is probably correct in many cases, Griffith [9] in Uganda found a lower content of organic matter in the mounds than in the surrounding soil, with an increase of available inorganic nutrients in certain mounds, and a decrease in others. He states that in some districts cotton grows better on termite mounds than elsewhere. Analyses of earth from nests of *Cyclotermes redemanni* by Joachim and Kandiah [15] in Ceylon, showed in most cases a reduction in organic matter, nitrogen and exchangeable bases as compared with the surrounding soil, but this relation appeared to be reversed in the case of the nests of *Hypotermes obscuripes*, which contain fungus gardens. These authors state that on *chena* (shifting cultivation) lands, crops generally grow best on termite sites and immediately around them. Vageler [26], states that in the grey-earth districts in Africa 'termite-infested red earths are for the most part considerably richer in plant food than the surrounding grey soil', and that 'In India this special composition of termitaries has been exploited on a large scale and in some cases with striking success'. Pendleton [22] states that the increased fertility of mounds in Thailand appears to be due to higher nutrient content, higher pH and better moisture relations. Kalshoven [16] cites cases of both high and low relative fertility of mounds in the East Indies.

Accumulation of $CaCO_3$ in termite mounds has been reported by Milne [19] in Tanganyika, Griffith [9] in Uganda, and Pendleton [22] in Thailand. Milne points out that in acid districts where there are two or more mounds to the acre there appears to be a serious depletion of lime from the surrounding soil. An analysis by Pendleton [22] showed a higher percentage of $CaCO_3$ in mounds than in the surrounding soil. The reason for this accumulation of lime in termite mounds is apparently unknown.

Harris [10] points out that where large mounds are numerous they cover an appreciable proportion of the ground surface, and clearing for aesthetic purposes, or to prepare the ground for mechanical cultivation, may be a formidable task. Apart from the cost of breaking up mounds which may weigh several tons, the disposal of the mound material, if it is less fertile than the surrounding soil, is likely to be a problem; one further aggravated by the difficulty of destroying cheaply the mound-building colonies. Unless this is done efficiently the colony will survive and rebuild the mounds.

Termites and Vegetation

Harris [10] points out that the relationships between termites and vegetation are diverse and complicated, but fall into two divisions. The first is ecological and derives from the problem of

termites and soil fertility. Soil changes due to termite activity are reflected in vegetational changes Troll, quoted in [10], describes in general terms the development of what he calls '*Termiten Savannen*' in Tanganyika. Morrison and others [20], in their investigations in the south-western Sudan, note that termite activity is an important factor in the development of eluvial woodland, but they emphasize that this question requires more intensive and thorough investigation. Foresters who are responsible for the improvement of savanna woodland are fully conscious of fire and erosion as limiting factors, and it would appear that the termite factor should also be taken into account. It is doubtful whether termites have any important silvicultural influence in rain forest.

Harris's second division is an economic one. Some people are convinced that termite attack is secondary and that termites do not attack healthy plants Harris [10] points out, however, that there are sufficient records of attacks on annual crops to suggest that this is an overstatement. There is possibly some relation between the attack on annual crops such as cotton, tobacco and maize, and the depletion of organic matter in land cleared from bush, after a few years' cultivation. The harvester termite is regarded as a grassland pest in South Africa and Kenya. Naudé [21], working on termites in relation to pasture in South Africa, draws attention to the severe damage that is done to the grass-veld by harvester termites under certain conditions of grazing and drought.

Termite damage to forest nursery stock and plantations can be a limiting factor under certain conditions of planting. It is reported that in Uganda [25] termites cause more loss in young plantations than any other pest, and that the only effective treatment is the laborious and expensive digging out of the queens.

Holmes [14], reports that in Ceylon weak seedlings of *Eucalyptus* spp. are attacked during periods of protracted drought. He also states that Jak (*Artocarpus integer*) is attacked by termites, and that *Eutermes greeni* causes considerable damage to pole-size Jak trees up to 3–4 ft. in girth. The incidence of the attack apparently increases progressively with the age of the plantation and is worst in plantations where thinnings have been neglected. The attack starts in dead snags, and the galleries spread downwards rather than upwards until the entire heartwood is permeated opposite to the site of attack. External symptoms of attack take the form of exposed galleries and 'a rust-coloured evil smelling exudate from the wounds which is often teeming with dipterous maggots'. Badly affected trees are felled and the infected sections cut out and burnt. Small wounds within easy reach are sponged with a solution of *p*-dichlorobenzene, D.D.T., or gammexane in petrol, and decayed portions are trimmed off and the surfaces protected by coats of tar.

Beeson [3] draws attention to termite root attack in young plantations of *Shorea robusta*, *Tamarix articulata* and *Tectona grandis*, and also to bark and stem damage. Manning [18] reports extensive damage to young Red Gum plants [*Eucalyptus* spp.] on tea estates in Ceylon. The termite, *Termefeae*, attacks the main root. For control he suggests multiple planting combined with pre-treatment of the baskets with a poison. If the attack persists he recommends watering the planting pits with hookah (nicotine) water. It is generally conceded that young *Eucalyptus* plantations are sometimes extremely vulnerable, and it would appear that attack is associated with periods of drought. It has been observed that attack is most severe towards the end of the dry season, when the soil is dry and young plants consequently low in vigour. Some people believe that the termite attacks the roots in search of moisture.

There is nothing in published literature or unpublished reports to suggest that termites constitute a serious forest pest, except occasionally as in the case of *Eucalyptus* plantations or in forest nurseries. The economic consequences in these cases, however, may be serious, and control measures applicable in tea plantations may not prove economically feasible for timber plantations. The humus-deficiency factor and natural food preferences obviously affect the incidence of attack. Control measures may be found along an ecological approach which recognizes that there must be a sufficiency of vegetation to provide the resident termite population with its cellulose and moisture requirements.

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ABSTRACT SECTION

0. GENERAL FORESTRY

01. TERMINOLOGY. NOMENCLATURE. BIBLIOGRAPHY. MATHEMATICAL AND STATISTICAL ANALYSIS

See also *For. Abstr.* 12 (Nos. 331, 746, 810, 828, 852, 854, 856).

1. ROE, A. L., and BOE, K. N. **Ponderosa Pine bibliography.** *Sta. Pap. Nth. Rocky Mt. For. Range Exp. Sta.* No. 22, 1950. pp. 74.

A bibliography of 687 references to literature on *Pinus ponderosa*, published prior to October, 1949. Compiled primarily from the standpoint of forest management, and arranged alphabetically under author. An alphabetical subject index is also given.

2. DORMAN, K. W., and SIMS, I. H. [Compilers.] **Loblolly Pine [*Pinus taeda*] bibliography.** *Sta. Pap. Stheast. For. Exp. Sta.* No. 6, 1949. pp. 65.

Covers the literature from 1890 to July, 1949, and is arranged under broad subject heads, with an author index.

3. NAIR, K. R. **Sampling techniques: adaptation of modern statistical methods to the estimation of forest areas, timber volumes, growth and drain.** *Indian For.* 76 (1), 1950 (31–5). 15 refs.

A brief review of literature with particular reference to practice in India.

4. NAIR, K. R. **A brief historical sketch of the introduction of statistical methods in Indian silvicultural experiments.** *Indian For.* 76 (2), 1950 (67–8).

02. TEXTBOOKS. MANUALS. DICTIONARIES. LISTS OF VERNACULAR NAMES

See also *For. Abstr.* 12 (Nos. 342, 746).

5. **Manual of timber management:—1. Legislation. 2. Timber estimating—field work. 3. Timber estimating—compilations. 4. Timber marking for partial cutting operations. 5. Methods of stumpage appraisal.** Ontario Department of Lands and Forests, Toronto. 1948. pp. 60; 70; 48; 25; 100.

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04. PHOTOGRAPHS AND PHOTOGRAPHY

See also *For. Abstr.* 12 (Nos. 835–7).

8. SMITHERS, L. A., and SUMMERS, J. W. **Control of contrast in forest stand photography.** *Silv. Leafl. For. Br. Can.* No. 41, 1950. pp. 2.

Photographs of forest stands can sometimes be improved by controlling photographic contrast more carefully. In order to determine the most successful combinations of over-exposure and under-development of negatives for controlling contrast, test exposures in various conditions were made. The results are given in a table. Hyperfocal distances for various lenses' focal lengths and F stops are given in another table. The general recommendations are as follows:—Use small F stops and focus the camera on the hyperfocal distance. Always use a tripod. Take photographs when there is no wind and, whenever possible, on dull, overcast days. If contrast is present, use control methods and record data for each negative carefully so that the proper development may be given.

05. PERIODICALS. ANNUAL REPORTS

See also *For. Abstr.* 12 (Nos. 20, 29–30).

9. SENNI, L. Le riviste forestali italiane e la selvicoltura. **[Italian forestry journals**

and [their influence on] forestry.] *Monti e Boschi* No. 2, 1950 (65–8). [It.]

Gives a short historical account of the various Italian periodicals dealing with forestry, from '*Rivista forestale*', which started in 1860, to *Monti e Boschi* which started in Jan. 1950.

10. ***Monti e boschi : rivista mensile del Touring Club Italiano.*** Touring Club Italiano, Corso Italia 10, Milan. 1 (1), Jan. 1950. pp. 50. [It.] Price 120 lire (220 lire abroad) per single issue; annual subscription 1,000 lire (1,500 lire abroad).

A monthly review of agriculture, forestry and mountain life.

11. **Annual report of the Forest Department [Singapore] for the year 1948.** Govt. Printing Office, Singapore. 1949. pp. 6.

The first printed report of the Forest Department, Singapore.

06. CONFERENCES

12. JENKINS, J. H. **Some impressions of the Third World Forestry Congress and the timber industry of Finland and Sweden.** *For. Chron.* 26 (1), 1950 (45–51).

13. **Natural resources.** *Unasylva* 4 (1), 1950 (2–6).

A review of the activities of the United Nations Scientific Conference on the Conservation and Utilization of Resources.

07. EDUCATION AND RESEARCH. ARBORETA. EXPERIMENTAL FORESTS

See also *For. Abstr.* 12 (Nos. 87, 221, 332–5, 636, 703, 747, 862).

14. SIERLA, V. O. Metsäkouluopetuksestamme. **[Forestry education.]** *Metsät. Aikak.* 1949 (11), (376–7). [Fi.e.]

Reviews and discusses forestry training and education in Finnish State Schools since the first school was started at Evo in 1876.

15. HENDERSON, F. Y., and MACDONALD, J. **Research in the United Kingdom.** *Unasylva* 4 (1), 1950 (15–21).

A survey of research in forestry and forest products in the United Kingdom.

16. ŠULC, J. Vývoj a činnost státního lesnického výzkumnictví v letech 1945–46. **[Development and activities of the Czechoslovakian State Forestry Research Institutes, 1945–46.]** *Zpr. výzkum. Úst. lesn. ČSR* No. 2, 1948 (7–27). [Cz.russ.e.]

17. ROL, R. C. **Organization of research in France. I. Forest research.** *Unasylva* 4 (2), 1950 (60–3). 6 refs.

18. Prolusione. **[Introduction.]** *Boll. Staz. For. Trieste* No. 1, 1947 (7–24). [It.E.]

Gives an account of the programme of research before the newly founded Forest Research Station at Trieste.

19. SOEST, J. VAN. De 'grote lijn' in het houtteeltkundig onderzoek. **[The main aspects of the forestry research work at the Forestry Research Station, Wageningen.]** *Korte Meded. Bosbouwproefsta. T.N.O., Wageningen* No. 5, 1950. pp. 15. [Du.e.] *Repr.* from *T.N.O.-nieuws* 5 (47), 1950 (79–83).

A semi-popular account of the aims and activities of the Station.

20. **Annual Report, 1948, of the East African Agriculture and Forestry Research Organisation.** East African Agriculture and Forestry Research Organisation, P.O. Box 601, Nairobi. 1949. pp. 37.

The first annual report of this new organization, which incorporates the East African Agricultural Research Institute, Amani.

21. ATKINS, E. S. **Field signs for demonstration areas.** *Silv. Leafl. For. Br. Can.* No. 43, 1950. pp. 2.

Describes notices giving descriptive data of treatments, age of stand etc., set up in demonstration areas of Petawawa Forest Experiment Station. The notices were typed on aluminium stencil-sheets and then sprayed with several coats of Krylon plastic spray, which provides a clear weather-proof coating. They were then fixed to ordinary wooden notice boards.

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Notes on silvicultural characteristics, growth rate etc., of the principal species in the arboretum. [Cf. *For. Abstr.* 12 (No. 239).]

09.1. *Forest History*

See also *For. Abstr.* 12
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09.2. *Pre-history. Pollen Analyses, etc.*

See also *For. Abstr.* 12 (Nos. 142, 890).

24. FIRBAS, F. Spät- und nacheiszeitliche Waldgeschichte Mitteleuropas nördlich der Alpen. Erster Band: Allgemeine Waldgeschichte. **[The late-glacial and post-glacial forest history of central Europe north of the Alps. Vol. I: General forest history.]** Gustav Fischer, Jena. 1949. pp. 480. 32 pp. of refs. [G.] Price *DM* 24 [*£2.7s. 0d.*]

A comprehensive summary of the present state of knowledge on this subject, based largely on the numerous pollen analyses etc. made in the past quarter of a century, under the main section headings:—Research methods; classification of periods in forest history; history of the distribution of the individual tree species; reasons for the late-glacial and post-glacial spread of tree species; composition and classification of the forests of the various periods; relationships of prehistoric and early historical settlement and forest history. There is a combined subject and species index.

25. NEČESANÝ, C. V. Příspěvek k historii lesů dolního Podyjí podle rozboru uhlíků ze staroslovanského pohřebiště v Přítlukách. **[Note on the forest history of the lower Dyje valley according to an examination of charcoals from the ancient Slav burial-place near Přítluky.]** *Lesn. Práce* 27 (10/12), 1948 (313–20). 8 refs. [Cz.russ.e.]

26. MÜLLER, P. Die Geschichte der Moore und Wälder am Pilatus. **[The history of the peatlands and forests of Mt. Pilatus.]** *Veröff. geobot. Inst. Rübel* No. 24, 1949. pp. 94. 10 refs. [G.g.]

27. POTZGER, J. E. **A contribution to the forest history of Quebec.** *Abstr.* in *Amer. J. Bot.* 36 (10), 1949 (819). [Butler University, Indianapolis, Ind.] O.B.D.

09.4. *Forest Statistics*

See also *For. Abstr.* 12
(Nos. 426, 660, 663, 680).

28. **Forest resources of the world. Supplementary data to the original FAO study.** *Unasylva* 4 (2), 1950 (57–9).
Cf. *For. Abstr.* 10 (No. 1548).

29. Domänverket år 1948 av Kungl. Domänstyrelsen. **[Work in the State Forests, 1948, by the Royal State Forestry Board.]** *Sveriges Officiella Statistik.* Kungl. Boktryckeriet. P. A. Norstedt & Söner, Stockholm. 1950. pp. 116. [Sw.]

30. **[Swiss forest statistics for 1948.]** *Schweiz. Forststatist.* 12 (4), [1949?]. pp. 38. [G.F.]

31. **Certain statistics relating to the Forest Department of Burma.** Forest Department, Rangoon. 1948. pp. 224. Price *Rs.*25.

Consists of tables giving figures of outturn 1884–1940, and financial statistics 1900–40.

09.7. *Monographs of Individual Forest Regions*

See also *For. Abstr.* 12
(Nos. 154–5, 159, 177, 219–20, 636).

32. HANDEL - MAZZETTI, P. VON. Die Forstwirtschaft Österreichs. **[Austria's forest economy.]** *Z. Weltforstw.* 13 (7/9), 1950 (109–19). [G.e.f.]

33. DOMINGUEZ, H. M. A floresta landesa. **[The forests of the Landes.]** *Pinhal e Resina* 2 (8), 1949 (21–34). [Port.]

Notes on the forests and their management.

34. GAUSSEN, H. Les forêts des Pyrénées françaises. **[The forests of the French Pyrenees.]** *Sciences: Revue de l'Association Française pour l'Avancement des Sciences, Paris* 75 (58), 1948 (417–32). [F.] L.S.

35. MESNIL, H. La forêt de Compiègne. **[The forest of Compiègne [: its history, management and manufactures].]** *Rev. Bois Appl.* 5 (6), 1950 (3–12). [F.]

36. Rapide incursion dans la forêt scandinave. **[A rapid tour of Scandinavian forests.]** *Bull. Soc. for. Franche-Comté* 25 (13), 1950 (522–45 + 8 photos). [F.]

37. VENET, J., and NOISETTE, A. La Suède forestière. **[Swedish forests and forestry.]** *Ann. Éc. Eaux For. Nancy* 11 (2), 1949 (497–652 + 4 maps). [F.]

Report on a tour made in 1948. In addition to description of the forest estate, silviculture and exploitation, there is an account of genetical research.

38. SABROE, A. S. **Forestry in Denmark: a guide to foreigners [prepared on the occasion of the Second Session of FAO, at Copenhagen].** The Danish Forest Society [Dansk Skovforeningen, Vester Voldgade 86³, Copenhagen] and the National Danish FAO Committee. 1946. pp. 110. 14 pp. of refs. [E.]

39. CHAMPION, H. G. **Forest notes from Holland.** *Emp. For. Rev.* 29 (1), 1950 (20–7 + 6 photos).

Notes on tours made in 1947 and 1948. Subjects discussed include afforestation of heathland, reclamation of dunes, shelterbelts, conversion of broadleaved to coniferous forest, introduction of broadleaved species in coniferous stands, introduction of other conifers in Pine forests, natural regeneration of Scots Pine, nursery practice, Oak forest, Beech forest, Poplar plantations, and polder reclamation.

40. RULE, A. **The Caspian forests of Persia.** *Emp. For. Rev.* 29 (1), 1950 (28–35 + 6 photos).

41. CHAPMAN, G. W. **Notes on forestry in Iraq.** *Emp. For. Rev.* 29 (2), 1950 (132–5 + 6 photos). 3 refs.

42. LACOURLY, G. Les forêts de Tunisie. **[The forests of Tunisia.]** *Schweiz. Z. Forstw.* 101 (4), 1950 (133–6). [F.g.]

43. SOUSA, A. DE F. GOMES E **A phytogeographical sketch of Mozambique.** *S. Afr. J. Sci.* 45, 1949 (43–55). 9 refs. A.P.B.

44. POURTET, J. Itinéraire forestier en Amérique du Nord. **[A forest tour in North America.]** *Ann. Éc. Eaux For. Nancy* 11 (2), 1949 (341–495 + 2 maps + 1 dgm.). 19 refs. [F.]

Report on a tour made in the U.S.A. and Canada in 1948. It includes the following sections—Monograph on principal forest species (40 pp.); monograph on principal forest types (28 pp.); the forest estate and its administration (9 pp.); forest management (26 pp.); timber utilization (7 pp.); forest protection (13 pp.); erosion control (5 pp.); wildlife conservation (8 pp.); the education of the public (6 pp.).

45. DUPRÉ CENICEROS, E. El problema forestal de México. **[The forest problem of Mexico.]** *Bol. Direcc. for. Caza, Méx.* Jan./Dec., 1949 (3–15). 5 refs. [Span.]

Discusses shortly the different climatic regions of Mexico, the forests and forest industries, causes of deforestation, measures taken for forest protection, the functions of the National Forest Council formed in 1948, fire-protection measures, and plans for establishing a research laboratory and 5 experiment stations.

46. Riquezas florestais da Guiana, Martinica e Guadelupe. **[Forest resources of [French] Guiana, Martinique and Guadeloupe.]** *Brasil madeireiro* 5 (58), 1949 (21–5). [Port.]

A brief account of the forests, methods of exploitation and the timber industry.

47. SWABEY, C. **Forestry in Dutch Guiana.** *Emp. For. Rev.* 29 (2), 1950 (125–31). 3 refs.

1. FUNDAMENTAL NATURAL LAWS OF THE FOREST

11.1. *Atmosphere. Meteorology*

See also *For. Abstr.* 12 (Nos. 323, 675).

11.14. Precipitations. Evaporation. Humidity

See also *For. Abstr.* 12 (Nos. 87, 323).

48. MARTIN, J.-J.-E. Influence de l'état boisé sur la pluviosité. **[The influence of forest on rainfall.]** *Rev. for. franç.* No. 4, 1950 (196–7). [F.]

The author has obtained figures of rainfall at St. Sever in the Landes and at Toulouse for 22 years between 1782 and 1818 and compares them with figures for 1891–1900 after the afforestation of the Landes. Figures are also given for the same periods for Paris. The results are shown in the following table:—

Stations	Annual precipitation: 22 years between 1782 and 1818	1891–1900	Difference
St. Sever .	709 mm.	938 mm.	+32%
Toulouse .	684 mm.	684 mm.	0%
Paris .	554 mm.	598 mm.	+6%

49. MAŘAN, B. Příspěvek ke studiu vlivu podrostů na relativní vlhkost vzduchu přízemních vrstev. **[The influence of underwood on the relative humidity of the air layers adjacent to the ground.]** *Sborn. čsl. Akad. zeměd.* 21 (1), 1949 (5–12). 18 refs. [Cz.e. russ.] A.C.P.

[Cf. *For. Abstr.* 10 (No. 1571); 12 (No. 303).] Relative humidity was measured at 20 cm. above ground level, at intervals of 30 min., from 6 a.m. onwards on individual spring, summer and autumn days in 1940 and 1943, in mixed Pine/Larch stands (with and without Oak/Hornbeam underwood) and Birch stands (with and without an underwood of Spruce), on a warm, dry area in central Bohemia. Results are given in tables and graphs. They show that the humidity regime of stands with underwood was more equable than that of stands without. During the day-time in the growing season the former always showed the higher humidity. This difference was most marked in the early afternoon, in summer and early autumn, and on cloudless days, i.e. under conditions of low humidity and high temperature in general.

11.16. Electricity. Radiations other than Light

50. FEHÉR, D. **Researches on the biological effect of the penetrating rays of the elements.** *Erdész. Kisérl.* 47, 1947 (212–21 + 28 photos, 2 tbls.). 56 refs. [E.]

A résumé, in English, of the author's previously published researches. [Cf. *For. Abstr.* 11 (No. 2470).]

11.4. *Soil*

See also *For. Abstr.* 12 (No. 832).

51. LUNT, H. A. **The forest soils of Connecticut.** *Bull. Conn. agric. Exp. Sta.* No. 523, 1948. pp. 93. 55 refs.

The present bulletin supersedes an earlier one published in 1932, and incorporates the results of research made in Connecticut since that date.

52. TARRANT, R. F. **A program of forest soils research for the Pacific Northwest.** *Northw. Sci.* 23 (2), 1949 (64–71). 11 refs. A.P.B.

53. FERRELL, W. K. **Preliminary report on some of the forest soils of the Western White Pine region of Idaho.** *Abstr.* in *Northw. Sci.* 24 (1), 1950 (35). [University of Idaho.] A.P.B.

11.41. Soil Physics

See also *For. Abstr.* 12 (Nos. 58, 65, 69–70, 88, 323, 840–1).

54. VAARTAJA, O. **High surface soil temperatures: on methods of investigation and thermocouple observations on a wooded heath in the south of Finland.** *Oikos* 1 (1), 1949 (6–28). 32 refs. [E.e.]

Experiments in the laboratory showed the importance of proper placing of the thermocouple for accurate records of soil temperatures. Readings were very erroneous if the wires of the thermocouple failed to pass through the thin surface layer of the soil. Considerable error also arose when the wires were placed on the soil surface, but for too short a distance.

In measurements at Siikakangas in S. Finland, surface-soil temperatures of 50–60° C. were often recorded; the maximum value was 63°. Temperatures were highest on a burnt-over area, and in gaps in the sapling stand, particularly under a group of tall reserve trees. Rises in temperature were greater in humus and litter than in bare sand, on all sites. Maximum temperatures of 50° C. were often recorded inside a Pine seed in fairly cool weather. The possibility of injury to young seedlings from excessive heat on dry heathy soils is suggested.

55. MOLCHANOV, A. A. Promerzanie i ottaivanie pochvy. **[The freezing and thawing of the soil.]** *Lesn. Khoz.* 1950 (1), (27–31). [Russ.]

Reviews Russian work on this subject, with special reference to the influence of snow

depth, depth of ground-water table, stand composition and forest type.

Tables are included in illustration.

56. **Influence of vegetative cover.** *Sth. Lumberm.* 179 (2249), 1949 (177).

Soil porosity tests at the Caltoun Experimental Forest near Union, S.C., showed that permeability rates under hardwoods are 25 times, and under softwoods 8 times more rapid than on bare clay. The soil under young Red Cedars [*Juniperus virginiana*] has 3 times the volume of open pores and 20 times the permeability of adjacent soils in the open.

11.42. Soil Chemistry

See also *For. Abstr.* 12 (Nos. 62, 69–70, 72, 678)

57. Hsu, W.-C., Li, L.-Y., and Li, C.-S. **Some chemical properties of four soil-types near Kushan, Foochow.** *Fukien agric. J.* 10 (3/4), 1949 (169–80). 17 refs. [Chin.e.]

This preliminary study, with tabulated results, includes one forest sandy loam.

11.43. Biology of Soil, including Mycorrhiza

See also *For. Abstr.* 12 (Nos. 322, 710).

58. Fehér, D. A hőmérséklet és a víz szabályozó szerepe az erdö életterében. **[Temperature and water as regulating factors in the forest environment.]** *Erdész. Lap.* 85 (4; 6), 1949 (74–7; 124–30). 16 refs. [Hu.f.e.g.]

The author gives a general account, supported by graphs and illustrations, of the results of his experiments. Micro-organic activity, as measured by the number of micro-organisms per unit weight of soil, can, he suggests, throw light on the interrelationship between soil temperature, soil moisture and forest growth. On the basis of 2 years' laboratory experiments, he presents a 3-dimensional graph which indicates optimum values for the two variables, temperature and moisture content, in terms of micro-organic population; by multiplying together the values of these two variables he obtains a value which he calls the *R* factor, representing their combined effect, and a curve of *R* against micro-organic population, illustrating how soil microbiological activity is governed by *R*. The relationship between the two may be expressed by an exponential equation (given), the curve of which is shown to follow closely an empirical curve derived from the observed data. The limits within which the micro-organisms increase with increasing values of *R* are set by the optimum values for soil moisture content (70–80% of the water capacity) and for soil temperature (25–26° C.). Beyond these values, an increase in *R* results in a fall in microbiological activity. Six years of experimental work confirmed this exponential relationship for a number of soil types (Spruce, Hornbeam and Oak forest soils and open fallow).

The second part of the article recapitulates work already published [cf. *For. Abstr.* 5 (246)], the results and significance of which are discussed at some length.

59. Melin, E., and Nilsson, H. **Transfer of radioactive phosphorus to Pine seedlings by means of mycorrhizal hyphae.** *Physiol. Plant., Copenhagen* 3 (1), 1950 (88–92). 9 refs. [E.]

By the use of a radio-active isotope, the authors were able to demonstrate that *Boletus variegatus*, as fungal symbiont, is able to transfer phosphorus to Pine roots. [Cf. *For. Abstr.* 11 (No. 843).]

60. Harris, J. O., Allen, E. K., and Allen, O. N. **Morphological development of nodules on *Sesbania grandiflora* Poir, with reference to the origin of nodule rootlets.** *Amer. J. Bot.* 36 (9), 1949 (651–61). 30 refs. O.B.D.

The anatomy of young and old multi-lobed nodules occurring over a period of one year on a woody species (*Sesbania grandiflora*) is described. The seeds were inoculated with highly effective strains of *Rhizobia*, and the plants were grown under controlled greenhouse conditions. Dissemination of the *Rhizobia* in the root cortex was entirely by infection threads which originated from root-hair infections. Thread formation persisted as the nodules increased in age and size and the threads continued to function in the apical areas of nodules from 12-month-old plants. All nodules examined on this species were exógenous. Young nodules are characterized by hemispherical meristems in contrast to multiple, interrupted, apical meristems in the old lobed nodules. Initial stages in vascular

tissue development were noted immediately after early infection of the cortical cells and reached a high degree of development in old nodules. As many as 126 vascular bundles were observed in many of the old nodules examined. The cortex of old nodules found on 8- and 12-month-old plants showed an abundance of sclereid cells with heavily lignified walls. The cells were often filled with tannin. An exceptional example of *Rhizobia* effectiveness, as shown by nodule size and age, mass arrangement of the nodules on the tap root, and duration of nodule function, is presented. Newly formed nodules on plants older than 4 months were rarely observed. The presence of growth-stimulating substances was indicated by the early development of a functional vascular system, a continuous meristematic activity throughout the life of the nodules, and by the formation and the growth of root primordia from vascular bundles of the nodule cortex. In regard to the latter, many of the old nodules found on the 8- and 12-month-old plants showed normally developed root initials and fully emerged rootlets. These rootlets arose within the endodermis of the vascular bundles and digested their way outwards at right angles to the vascular strand from which they were derived. The hypothesis is advanced that rootlet origin in these nodules resulted from a stimulation or irritation of the host cells caused by the accumulation of by-products produced in the bacteroid area. The following factors are believed to explain the longevity of the nodules on this species: (*a*) continuously active meristematic area, (*b*) functional longevity of infection threads, (*c*) an elaborately developed vascular system, (*d*) the prevalence of non-invaded cells in the bacteroid area, (*e*) a well defined cortical sclerenchyma, and (*f*) the gradual disintegration of the bacteroid area. Hollow nodules consisting of cortical shells, from which rootlets continued to grow, remained firmly attached to the roots of the 8- and 12-month plants. These appeared to be serving the plant as intermediate vascular links between the nodule rootlets and the parent root. *Authors' summary.*

61. RENKONEN, O. **A controlled method for separating terrestrial nematodes [from the moss and humus layer of forest soils].** *Oikos* 1 (1), 1949 (79–82). 9 refs. [E.]

Cf. *For. Abstr.* 11 (No. 1603).

11.44. Litter. Surface Humus

See also *For. Abstr.* 12 (No. 65).

62. JENNY, H. **Causes of the high nitrogen and organic matter content of certain tropical forest soils.** *Soil Sci.* 69 (1), 1950 (63–9). 5 refs.

The organic-matter contents were studied and compared in 4 profiles (2 from California and 2 from Colombia) representative of soils of large areas. In the tropical profiles the bulk of the organic matter was inside the mineral soil, and the total N contents were 4–5 times as high as in the Californian soils. It is concluded that average annual N gains are high in the tropical soils, because of a high addition of N compounds in the rain water, and a high non-symbiotic and symbiotic fixation of atmospheric N. This enrichment in soil N is accompanied by a luxuriant growth of vegetation and the formation of large amounts of rapidly decomposing litter. Because of the high rainfall a large proportion of the soluble and dispersible decomposition products migrate into the mineral soil, where decomposition is slow. Humus, therefore, accumulates inside the mineral soil, to a high level, and several centuries are required to build up soil organic matter to a quasi-equilibrium. [Cf. *For. Abstr.* 11 (No. 2485).]

63. SARTZ, R. S., and HUTTINGER, W. D. **Some factors affecting humus development in the Northeast.** *J. For.* 48 (5), 1950 (341–4). 5 refs.

The data presented in this paper were collected on randomly selected plots distributed throughout the 11,700 sq. miles of the Allegheny River basin. The soils are of the grey-brown podzolic group with a smaller area of podzols on the plateau. The principal forest types are northern hardwoods and Oak with some small areas of White Pine/Hemlock. It was shown that depth of humus (1) increases with the age of stand until maximum foliage production is reached, and (2) is directly correlated with stand density, which controls the balance between organic accumulation and decomposition. Logging, fire, and grazing have destructive effects on humus layers, varying with their intensity, frequency, or duration. Evidence was found that north-east slopes develop deeper humus layers than other aspects, and that microtopographic features cause extreme

variations in humus depth. There was also some evidence that, other things being equal, less humus is likely to develop on sandy soils than on heavier-textured soils.

64. STEINER, M. Die Bedeutung autolytischer Abbauvorgänge für die Mineralisierung des organischen Phosphors toter Pflanzensubstanz. [**The significance of autolytic decomposition processes in the mineralization of organic phosphorus in dead plant material.**] *Biol. Zbl.* 67 (1/2), 1948 (84–8). 2 refs. [G.g.e.f.russ.] [Botanische Anstalten-der Universität Göttingen.] E.M.B.

The P content of autumn leaves of *Acer pseudoplatanus* (both fallen and still on the tree) was investigated. Three stages were observed in the fluctuations in P content of individual leaves:—(*a*) formation in the leaf of P compounds, capable of decomposition by autolytic processes, (*b*) enzymatic decomposition of these compounds and the formation of inorganic P, and (*c*) washing out of the inorganic P from the fallen leaf into the soil. These processes do not take place at the same time in individual leaves of the same tree. The experiments demonstrate clearly in this case the importance of a type of decomposition which is non-microbial.

65. PLACE, I. C. M. **Comparative moisture regimes of humus and rotten wood.** *Silv. Leafl. For. Br. Can.* No. 37, 1950. pp. 2. 3 refs.

In view of the abundant natural regeneration often found on rotten logs and stumps when the surrounding forest floor is almost bare [cf. *For. Abstr.* 8 (No. 1025); 10 (No. 2547)], an attempt was made at the Acadia Forest Experiment Station to determine the relative moisture regimes in the two seedbeds. A Bouyoucos bridge was used to measure soil moisture *in situ*. Five pairs of blocks were buried about an inch below the surface in rotten wood and in immediately adjacent humus, and readings were taken every 2–3 days from 7 June to 24 August. Despite an abnormally dry summer, the moisture content of the rotten wood remained for the most part just slightly below field capacity, and only after 30 days of drought did it approach wilting point. During the same period, the moisture content of the humus dropped below wilting point 4 times, one of them lasting for 20 days.

11.49. Soil Types

See also *For. Abstr.* 12 (No. 57).

66. WILDE, S. A., WILSON, F. G., and WHITE, D. P. **Soils of Wisconsin in relation to silviculture.** *Publ. Wis. Conserv. Dep.* No. 525–49, 1949. pp. 171. Numerous refs.

A fairly detailed study in three sections: (1) immature soils, (2) soils in the podzol region of conifers and northern hardwoods, and (3) soils in the prairie-forest region of Oak and associated hardwoods. In each section the various soil types and the composition of the forest stands are described, with notes on biological aspects of interest, data on rate of growth of the trees, and information on the silvicultural treatment of the forests.

67. FOSTER, D. L. **Hardwood tree growth on three soil types in central New York.** *Abstracts of Theses, Cornell University, Ithaca, New York, 1947*, 1949 (425–8). C.G.B.

The soils studied were Honeoye silt loam, Lansing silt loam and Bath silt loam, all of which are deep, well drained, and developed largely from glacial till derived from acid Devonian shales and sandstones, with different proportions of limestone. The Bath contains no limestone, and is acid throughout. Honeoye and Lansing are weakly developed grey-brown podzolic soils; Bath is a brown podzolic soil. The tree growth study indicated that soil characteristics providing a good site for the species supported [*Acer saccharum*, *Fraxinus americana*, *Tilia* sp., *Quercus borealis*, *Fagus* sp., *Acer rubrum*, *Carya cordiformis*, *Ulmus americana*] include high content of exchangeable Ca and Mg, high pH, high % base saturation, and the presence of a coarse mull humus layer. The Honeoye soil was superior to both the others in these respects.

68. KRUEDENER, A. FRH. VON. Lösslehmböden und Fichtenreinbestandswirtschaft durch Generationen, auf Grund von in den Jahren 1941 und 1942 im Freien und im Laboratorium ausgeführten Untersuchungen. [**Loess clay-loam soils and the management of Norway Spruce in pure stands for generations, on the basis of field and laboratory studies in 1941 and 1942.**] *SchrReihe Akad. dtsch. Forstwiss.* No. 7, 1943. pp. 86 + 24 plates. [G.g.]

A study of the podzolization and gleying of brown forest soils under Spruce, with consequent deterioration of the stands themselves,

at Laugna, near Augsburg. Includes recommendations on remedial measures and future management. Spruce must continue to be the main species, but in mixture with hardwoods.

69. MAŘAN, B. Příspěvek ke studiu půdních typů jihočeských borů. **[A study of the soil types on S. Bohemian Pine sites.]** *Zpr. výzkum. Úst. lesn. ČSR* No. 2, 1948 (28–52). 31 refs. [Cz.russ.e.] [Ústav lesní biochemie a pedologie, Prague.]

The high-quality S. Bohemian Pine [*P. sylvestris*] occurs in the České Budějovice region and especially in the neighbourhood of Třebon. The author briefly reviews the geography, geology and climate of the region and proceeds to give detailed results from physical and chemical studies of soil profiles on characteristic Pine sites—(1) dry sites with a deep water table (both clays and sands), (2) wet gleys, and (3) acid peat soils.

70. PELÍŠEK, J. Půdy lužních dubin dolního Pomoraví. **[The soils of the bottomland Oak woods of the lower Morava valley.]** *Lesn. Práce* 28 (4/5), 1949 (160–71). [Cz.russ.e.] [Ústav geologie a les. pedologie vysoké školy zemědělské, Brno.]

Gives profile descriptions and the results of mechanical and chemical analyses of the soils at various places in these woods, which occupy large areas in the region. The soils are alluvia deposited by the Morava, mostly heavy clay-loams with a seasonally varying water table. A gley horizon, at a depth of 1–2 m. and locally as little as 30 cm. below the soil surface, limits the depth of the root systems of the Oak (*Quercus robur*). Most of the soils are moist, slightly acid, with a considerable humus content (especially in the upper horizons, but also throughout the profile) and adequate supplies of Ca, Mg, P_2O_5 and especially K.

71. LACHAUSSÉE, E. Les sols sous la dominance de l'eau et la forêt. **[Water-logged soils and the forest.]** *Rev. for. franç.* No. 5, 1950 (246–73). 21 refs. [F.]

By 'waterlogged soils' the author understands soils constantly or temporarily submerged and soils covering a water-table at less than 2 m. below the surface. The different types of gley horizon are described, and the effects of forests on them are analysed. In the past, attempts have been made in France to improve such soils (1) by drainage and (2) by afforestation. Investigation of such areas in the forest of Chaux demonstrates that when the drainage ditches are neglected the water-table rises again and the trees become stag-headed and eventually die. The only species whose roots can penetrate a gley horizon are Alders, Willows, and American Red Oak [*Quercus borealis* var. *maxima*]. In the Forest of Chaux, plantations of Red Oak have been made in several places on very compact clays having a gley horizon at a depth of less than 35 cm., where *Q. robur* dies back at 80–100 years. Stem analyses and excavation of root systems showed that the Red Oak has a powerful tap root which pierces the gley horizon that *Q. robur* cannot penetrate. Its abundant litter of dead leaves decomposes more slowly than that of Alder, but a mixture of the two species rapidly improves the worst gley soil. At 40 years old the Red Oak has a straight stem, 25 m. high and 35 cm. d.b.h., with a volume of 1–1·2 cu.m., whereas *Q. robur* and *Q. sessiliflora* do not attain this volume until they are about 100 years old. The Red Oak gives abundant natural regeneration from *ca.* 30 years and is also easy to propagate in the nursery.

72. DUCHAUFOUR, P. Sur quelques types de sols forestiers de l'est de la France, sur roche-mère calcaire. **[Some types of forest soil in eastern France on limestone.]** *C.R. Acad. Agric. France* 35 (10), 1949 (391–4). 12 refs. [F.] A.P.B.

A summary of observations on the evolution of vegetation and soil, made in Beech forest on calcareous soil near Nancy. The action of organic matter on calcareous soils colonized by forest vegetation passes through two phases: (1) rendzinas and rendzina-like soils. Progressive 'decarbonation' which can be expressed by the reaction: humic acid + $CaCO_3$ = Ca humate + calcium bicarbonate. The last, being soluble, is leached out. At the same time the soil becomes charged with flocculent and insoluble Ca humate and takes on a black colour. (2) Brown forest soils. The Ca humates become progressively desaturated and decompose more rapidly. The soil takes on the appearance of a brown soil. At the same time a small part of the 'mild' humus migrates and affords colloidal protection to the clays and ferric oxides, provoking a slight leaching of these, and giving rise to an accumulation horizon at a deeper level.

73. SKERMAN, P. J. **The use of vegetation [*Eremophila mitchelli*, and *Casuarina luehmanni*] in locating solonetz soils in Queensland.** *Queensland Journal of Agricultural Science, Brisbane* 5 (1), 1948 (17–22). 2 refs. D.S.I.R.

11.6. *Hydrographical Conditions. Water and Soil Conservation*

See also *For. Abstr.* 12
(Nos. 177, 301, 316–23, 636, 686, 693).

74. FORD ROBERTSON, F. C. **The influence of vegetation on floods.** *Proceedings of the Conference on Biology and Civil Engineering 1948, Institution of Civil Engineers, London.* 1949 (64–74 + 3 photos). 10 refs. With discussion, pp. 84–98.

75. MORAN, B. J. J. **The use of vegetation in stabilizing artificial slopes.** *Proceedings of the Conference on Biology and Civil Engineering 1948, Institution of Civil Engineers, London.* 1949 (113–23 + 4 photos).—With discussion, pp. 128–41.

76. CHAPMAN, V. J. **The stabilization of sand-dunes by vegetation.** *Proceedings of the Conference on Biology and Civil Engineering 1948, Institution of Civil Engineers, London.* 1949 (142–57 + 1 photo).—With discussion, pp. 170–80. 14 refs.

77. BURGT, J. H. VAN DER, and BENDEGOM, L. VAN. **The use of vegetation to stabilize sand-dunes.** *Proceedings of the Conference on Biology and Civil Engineering 1948, Institution of Civil Engineers, London.* 1949 (158–70 + 12 photos)—With discussion, pp. 170–80.

78. DUGELAY, [A.] La conservation des sols dans le midi méditerranéen. **[Soil conservation in the Mediterranean region of the south of France.]** *Rev. for. franç.* 1950 (3), (157–69). [F.]

79. GEORGE. La conservation des sols en Tunisie. **[Soil conservation in Tunisia.]** *Rev. for. franç.* 1950 (3), (145–8). [F.]

80. JACKSON, J. K. **The Dongotona Hills, Sudan.** *Emp. For. Rev.* 29 (2), 1950 (139–42 + 8 photos). 1 ref.

It is shown that the widespread erosion and drying up of perennial streams have taken place within comparatively recent times, owing largely to invasion by the Dongotona tribe and their unsuitable methods of agriculture.

81. CHALLOT, J.-P. Le problème de la défense et de la restauration des sols au Maroc. **[The problem of soil protection and rehabilitation in Morocco.]** *Rev. for. franç.* 1950 (3), (149–56). [F.]

82. SACCARDY. La lutte contre l'érosion du sol en Algérie. **[Erosion control in Algeria.]** *Rev. for. franç.* 1950 (3), (137–44 + 5 photos). [F.]

83. ROBERTSON, W. A. **Note on soil conservation work in Algiers.** *Emp. For. Rev.* 29 (1), 1950 (40–3 + 8 photos).

84. **Soil erosion: its prevention and control.** Government Press, Madras. 1948. pp. 184 + 158 photos, dgms. + 1 map. 63 refs.

A text-book for departmental officers and students, prepared by a Committee consisting of the heads of the Departments of Agriculture, Irrigation, Forestry, and Public Health, in Madras.

85. BAUDENDISTEL, M. E. **Some forestry aspects of the Department of Agriculture flood control survey of the Missouri river watershed.** *Abstr.* in *Northw. Sci.* 23 (1), 1949 (25). [Nth. Rocky Mt. For. Range Exp. Sta.] A.P.B.

Outlines the general principles of a soil conservation programme.

86. FRIEDRICH, C. A. **Seeding forage plants on burned and cut-over lands in Western Montana.** *Northw. Sci.* 22 (4), 1948 (147–54). 3 refs. A.P.B.

Trials in sowing grass from aeroplanes in Montana [cf. *For. Abstr.* 9 (No. 2067)] have shown that chances of success are good under dense stands of fire-killed timber, where the disturbance was severe enough to expose the mineral soil and destroy practically all the original vegetation. They are less good on burns in open stands, where the ground cover is not usually destroyed by burning, and the soil is frequently so firm and mossy that broadcast seed does not get covered by natural means. Sowing is most successful when done as soon as possible after logging (though not in midwinter or midsummer), before the soil is crusted by rain or invaded by other plants.

87. RHODES, F. L. **The cooperative snow investigations program: its objectives and operations.** *Abstr.* in *Northw. Sci.* 23 (1), 1949 (26–7). [Cooperative Snow Investigations, Army Engineers, Oakland, Calif.] A.P.B.

A brief outline of the organization and its work.

88. EVANKO, A. B. **A tin can infiltrometer with improvised baffle.** *Res. Note Nth. Rocky Mt. For. Range Exp. Sta.* No. 76, 1950. pp. 2 + 1 photo. 1 ref.

12. FOREST BOTANY. TREE SPECIES

12.1. *General Botany*

12.11. Physiology. Reproduction. Growth

12.11.1. *Plant constituents. Metabolism. Photosynthesis. Translocation. Sap Flow. Transpiration. Growth Substances*

See also *For. Abstr.* 12 (Nos. 58–9, 64, 109–11, 117, 119, 394–9, 637–47, 654–6, 678–9, 710, 736, 835–6).

89. PLOUVIER, V. Nouvelles recherches sur le québrachitol des Sapindacées et Hippocastanacées, le dulcitol des Célastracées et le saccharose de quelques autres familles. [**New studies on quebrachitol in Sapindaceae and Hippocastanaceae, dulcitol in the Celastraceae and saccharose in some other families.**] *C.R. Acad. Sci., Paris* 228 (24), 1949 (1886–8). 2 refs. [F.] D.S.I.R.

The presence of quebrachitol in Sapindaceae, Hippocastanaceae, and Aceraceae, illustrates the close relationship between these families; the presence of dulcitol in the Celastraceae separates them from neighbouring families.

90. EULER, H. VON, HELLER, L., and HÖGBERG, K. G. Nukleoproteide aus Pollen von Birke (*Betula pubescens*). [**Nucleoproteins in Birch pollen.**] *Arkiv för Kemi, Mineralogi och Geologi, Stockholm* 26*A* (21), 1949 (1–15). 28 refs. [G.g.] [Institut für organisch-chemische Forschung, Universität, Stockholm.] O.R.S.

Fractions of different composition and particle size were obtained from Birch pollen by differential centrifuging of the cell membranes after they had been ground for 2 hours with powdered glass. No nucleic acid was found in particles which could be seen in the microscope, but the submicroscopic fraction contained a considerable amount of ribonucleic acid. In the extract remaining after precipitation of the submicroscopic fraction with acetic acid, the presence of a considerable quantity of free ribonucleic acid, which was readily precipitated with acetic acid, was established. Determination of the content of ribonucleic acid in the total pollen by a phloroglucinol method showed about 10% based on dry weight in pollen of *Pinus montana* and about 9% in that of *Betula pubescens*. The diphenylamine method gave 0·5% of desoxyribonucleic acid in pollen of *P. montana*.

91. EULER, H. VON, and EULER, J. VON. Über die katalatische Wirkung pflanzlicher Zellen. [**On the catalase action of plant cells.**] *Arkiv för Kemi, Mineralogi och Geologi, Stockholm* 26*A* (22), 1949 (1–12). 24 refs. [G.] O.R.S.

Includes a section on catalase action in Birch pollen, and the effect on it of heat and of streptomycin.

92. SUBBA RAO, V., and SESHADRI, T. **Chemical composition of the flowers of *Butea superba*.** *J. sci. industr. Res., India* 8*B* (10), 1949 (178–9). 9 refs. [Andhra University, Waltair.] D.S.I.R.

93. RODWELL, C. N. **Rutin in two Eucalypts.** *Nature, Lond.* 165 (4202), 1950 (773). 7 refs.

Rutin was isolated at the Division of Plant Industry, C.S.I.R.O., from branches, leaves and buds of *Eucalyptus macrorrhyncha* and from *E. youmani*.

94. IVANOV, V. V. O yadovitosti plodov boyarÿshnika. [**On the poisonousness of Hawthorn fruits.**] *Priroda, Moskva* 38 (10), 1949 (67–8). 8 refs. [Russ.] A.C.P.

Draws attention to cases of illness, with symptoms of slight and transitory poisoning, in young people who had eaten too many fruits of *Crataegus sanguinea* and *C. ambigua*. These two species are common in undergrowth in the valley of the Ural river and W. Kazakhstan. The inhabitants confirmed that children are

sometimes temporarily ill from an excess of the fruits, which are eaten locally as a cheap sweetmeat and are sometimes made into jam. The author refers to literature reporting that preparations from leaves and fruits of some Hawthorns [unspecified] stimulate the heart, act as nervous sedatives and raise blood pressure. He suggests that the fruits of the two species in question should be further investigated as a possible source of pharmaceutical preparations.

95. HOLMBERG, B. Zur Kenntnis des Frühjahrssafts der Birke. [**A study on the spring sap of Birch.**] *Arkiv för Kemi, Mineralogi och Geologi, Stockholm* 26*B* (15), 1949 (1–6). 10 refs. [G.] [Org.-chem. Abteilung des Nobelinstituts der Kgl. Akademie der Wissenschaften, Stockholm 50.] O.R.S.

Samples of sap from different heights in a stem of *Betula verrucosa* were examined. No pentoses, galactose or mannose were found. The sugars present were almost exclusively glucose and fructose. Results are tabulated. Graphs showing the sap pressure at different times of day are given.

96. KRUPENIKOV, I. A. O soleustoychivosti tamariksa v svyazi s ego sposobnost'yu k izbiratel'nomu 'nakopleniyu' soley v assimiliruyushchikh organakh. [**The salt resistance of Tamarisk in relation to its capacity for the selective accumulation of salts in its assimilating organs.**] *Dokl. Akad. Nauk SSSR* 56 (7), 1947 (765–8). 2 refs. [Russ.] A.P.B.

Refers to the rôle of the hydathodes in removing excess salts from members of the genus *Tamarix*, and proceeds to describe a study on the salt content and salt resistance of *T. gracilis* in N.W. Kazakhstan, where it grows only on saline soils (though farther south it is not an obligate saline species). The areas studied were (1) a chloride-type saline soil, the salt content of which was concentrated in the uppermost horizon, and (2) a sulphate-type soil with a salt content more or less uniform throughout the profile. Despite these soil differences, the aqueous extracts from green parts of *T. gracilis* were remarkably similar in composition. They showed a total content of water-solubles (based on oven-dry plant weight) of over 40%, mineral salts predominating and organic water-soluble substances being comparatively low (7–9%). The contents of Cl' and SO_4'' were almost equal (both about 8–8·5%), with a slight excess of Cl', irrespective of the soil contents of these ions.

It is therefore inferred that *T. gracilis* must both absorb and accumulate these ions selectively. Similar behaviour has been previously recorded for *T. karelini*. Analytical data for the soil and plant extracts are tabulated.

97. WALTER, H. Über die Assimilation und Atmung der Pflanzen im Winter bei tiefen Temperaturen. [**Assimilation and respiration in plants in winter at low temperatures.**] *Berichte der deutschen botanischen Gesellschaft, Berlin* 62 (2), 1944–1949 (47–50). [G.g.] O.B.D.

Herbaceous winter-green plants have no proper period of winter dormancy. Assimilation ceases at – 2 to – 3° C. and respiration at – 6 to – 7° C. Spruce, on the other hand, becomes dormant during long periods of frost, assimilation and respiration ceasing completely. *Prunus laurocerasus* is not adapted to winter temperatures, assimilation ceasing at temperatures as high as + 4·5° C.

98. KONIS, E. **The effect of leaf temperature on transpiration.** *Ecology* 31 (1), 1950 (146–7). 7 refs.

In order to ascertain the dependence of transpiration upon the temperature gradient between air and leaf, measurements were made near Jerusalem of the transpiration rates of identical leaves with varying temperature increments (temperature increment = the difference between atmospheric temperature and that of the leaf). Varying temperatures were induced in adjacent leaves of approximately equal area and weight, by varying their positions so that they were either horizontal or vertical while their transpiration was being measured. This method was based on the fact that the temperature increment of a horizontal leaf in the subtropical zone at noon in the summer is many degrees higher than that of a vertical leaf, since a horizontal leaf under such conditions lies nearly at right angles to the sun's rays. All observations were made during the noon hours of June and July on calm days. The results are summarized in a table which correlates the degree of transpiration with the temperature increments of horizontal and vertical leaves of maquis plants.

It was found that the temperature increments of the leaves of maquis plants on a clear summer day are capable of increasing transpiration by as much as 30–230%. The marked influence of the leaf's position on its rate of transpiration in the subtropical zone is emphasized. The results of these experiments lead to certain conclusions about the study of transpiration and methods of measuring it:— (1) In field studies, observations on the temperature of a plant should be included among other data; otherwise interpretation of the transpiration curves is likely to be misleading. (2) The effect of radiation on increase of transpiration rate may be largely attributed to the increased temperature increment it induces. (3) The marked changes in transpiration occurring rapidly after clouding of the sun, are to be attributed chiefly to temperature changes in the leaves, at any rate in plants whose stomata move slowly, as do those of maquis plants. (4) When transpiration is measured by means of rapid determinations of the weight of detached portions of a plant, the leaf should not be exposed to the sun in any accidental position, but should be placed at the angle assumed by most of the plant's leaves in their natural positions. In any case it is essential to record the angle of exposure together with the rest of the data. (5) The temperature increments of the separate leaves of a plant differ according to their varying angles of exposure to the sun's rays, their position on the plant, and their varying exposures. It is therefore impossible to predict the transpiration of an entire plant on the basis of a few single leaves, particularly where trees are concerned. (6) The temperatures of leaves in direct sunlight undergo marked and rapid fluctuations as a result of various factors such as changes in radiation intensity and in wind velocity, and consequently transpiration rates will undergo rapid variations. It is therefore necessary to conduct as extensive a series of parallel experiments as possible and extract a mean value from the results, since single observations are unreliable.

12.11.2. *Reproduction. Propagation. Growth. Development*

See also *For. Abstr.* 12 (Nos. 129 *et seq.*, 243–4, 293, 634).

99. Voropanov, P. V. Praktika prokhodnykh i vyborochnykh rubok v svete ucheniya Michurina—Lysenko. **[The practice of thinnings and selection fellings in the light of the teaching of Michurin and Lysenko.]** *Lesn. Khoz.* 1950 (1), (19–26). 4 refs. [Russ.]

The author refers to Lysenko's theory of life stages according to which all plants pass through 3 main phases—(1) *juvenile*, in which all characters are plastic, the plant is incapable of sexual reproduction, and is shade-bearing and sensitive to frost; (2) *mature*, in which the characters are more stable, and the plant reproduces intensively and shows less adaptability to environmental changes, and (3) *senescent*, with a characteristic loss of plasticity and adaptability. He quotes Nikitin's views on the application of the idea of physiological youth to thinning practice, an idea which implies that suppressed trees, being kept in a non-fruiting, physiologically young stage (physiological youth implying physiologically young protoplasm), are capable of a better response to liberation than are dominants of the same actual age but physiologically older. Reference is made to observations by various Russian authors showing that suppressed Norway Spruce is capable of responding favourably to release up to an advanced age, even 300-year-old trees having been reported as capable of some response. The author's own previous work (1930) on Norway Spruce in N. Russia, leading to a special tree classification by light requirements, tree size and occurrence of fruiting, and to thinning rules based on this classification, is re-interpreted in terms of Lysenko's theory, with which it shows complete agreement in principle. Since the osmotic pressure of needle cell-sap is held to be a good index to the exchange of materials, the author and T. A. Leukhina in 1949 carried out cryoscopic determinations of the osmotic pressure of cell-sap of 1-year-old needles from Norway Spruce trees of various ages. Their findings are tabulated to show that although, *ceteris paribus*, osmotic pressure increased with increasing (actual) age, it was lower in old, non-fruiting trees than in younger, fruiting ones. The latter, regarded as physiologically old, had a relatively high osmotic pressure approaching that of trees which were 'old' both physically and physiologically. The article concludes with further discussion of recommended practice in thinning and selection fellings in Norway Spruce to conform with the arguments

advanced, involving (1) removal chiefly of defective, large trees that have declining increment and are physiologically old, (2) a consequent improvement in health and productivity and conversion to uneven-aged structure, and (3) obliteration of 'artificial distinctions between thinning and selection fellings'.

100. MÜLLER-STOLL, W. R. Beobachtungen über Wuchsform und Zapfenbildung bei vegetativ vermehrten Fichten. [**Growth habit and cone formation in Spruce propagated by vegetative means.**] *Züchter* 17/18 (13/15), 1947 (422–30). 17 refs. [G.g.] [Forstbotanisches Institut und Versuchsabteilung für Forstpflanzenzüchtung, Tharandt.] L.S.

Fifteen-year-old Spruce trees, which had been formed by grafting shoots from the top of old Spruce seedbearers on to a rootstock, showed definite deviations from the normal, notably in their smallness, bushy habit, early fertility and exclusively female flowering. The last characteristic is probably the result of the tendency of *Picea abies* to produce only female flowers on the upper branches. The small, stalkless cones developed always at the end of the youngest shoots and not from special buds. Such cones as were otherwise normal, developed principally from the terminal buds of the upper branches. It is this flowering habit which appears to have hindered the normal vegetative growth of the tree and produced the characteristic smallness and bushiness. Similar characteristics appear in a graft of *P. abies* var. *acrocona*. It is suggested that this variety arose through spontaneous and accidental rooting of a normal shoot from the upper part of the parent tree.

101. **Effective pollination distances.** *Rep. Ntheast. For. Exp. Sta. 1949*, 1950 (12–3).

Pollen counts made at varying distances from heavily pollinating trees corroborate observations on fruitfulness of isolated trees. Species of Spruce, Fir, Oak and Pine have yielded little viable seed except where trees of the same species were growing close by. It is clear that air-borne pollen of many of these species travels only short distances in quantity, and that distances of only a few hundred feet may be the limiting factor for production of viable seed. For *Pinus strobus* near Philadelphia, production of viable seed was only 0·3–1·8 per cone on trees isolated from pollinating neighbours by 200 ft. or more.

Observations on White Pine, some Maples, Firs, Yellow Poplar [*Liriodendron tulipifera*] and Spruce, confirmed the occurrence of parthenocarpy. Cones or fruit of normal size are matured but with empty seeds or none. Thus the number of cones or the size of the fruit crop on forest trees which may be isolated at distances sufficient to prevent pollination, is no indication of a good seed crop.

102. BUELL, M. F. **Mass dissemination of Pine pollen.** *J. Elisha Mitchell sci. Soc.* 63, 1947 (163–7). 4 refs. L.S.

Pollen was collected daily for 4 days (12–16 April) on slides within a *Pinus echinata* forest, and at varying distances (up to ¼ mile) along a line extending eastward from its margin into open farmland. It was discovered that the quantity of pollen falling to the ground in the forest is very much greater than that which is carried beyond the forest margin. For the first $\frac{1}{10}$ mile from the forest the amount drops off rapidly; beyond that distance, gradually. At ¼ mile, in non-mountainous county, 10% of the pollen falling within the forest itself can be expected. The amount of pollen lifted from the forest depends on the relative stability of the atmosphere: the more turbulent the atmosphere, the greater is the proportion of pollen carried away from the trees. *From author's summary.*

103. PYATNITSKI, S. S. Ob usloviyakh prorastaniya pŷltsŷ duba *in vitro*. [**Conditions for the germination of Oak pollen *in vitro*.**] *Dokl. Akad. Nauk SSSR* 56 (6), 1947 (659–61). 9 refs. [Russ.] A.P.B.

[Covers the findings on optimum sucrose concentration for pollen germination reported in *For. Abstr.* 10 (No. 1605), with the following additional information:] It was early discovered that a drop of extract from the stigma of the same species was necessary for good germination *in vitro*, but that the age and condition of the stigma had no significant influence on this effect. Boiled stigmas, and to a small degree the liquid in which stigmas had been boiled, also stimulated germination. Addition of 0·001% of boric acid or of folliculin in various concentrations to the sucrose solution, gave better germination than pure sucrose solution, but proved less effective than stigma extract. Pieces of the vegetative tissues (peduncles,

leaves, stems) not only of Oak but also of other species and families, whether or not from plants that had flowered, also acted as stimulants, increasing not only germination but also the rate of growth and size of pollen tubes formed *in vitro*, presumably owing to the action of wound hormones.

104. MORETTINI, A. Biologia fiorale del castagno. **[The floral biology of *Castanea sativa*.]** *Ital. agric.* 86 (12), 1949 (721–31). 24 refs. [It.] E.M.B.

105. ZARUBIN, A. F. O vozmozhnosti partenogeneza u gretskogo i chernogo orekhov. **[On the possibility of parthenogenesis in *Juglans regia* and *J. nigra*.]** *Priroda, Moskva* 38 (10), 1949 (64–5). [Russ.] A.C.P.

Reports on experiments at the Kirghizian research station of the Forestry Institute of the U.S.S.R. Academy of Sciences (Dzhalal-Abad region) in Walnut forest on the S. slopes of the Ferghana ridge. *Juglans regia*:—On May 9–12, 1948, *ca* 70 ♀ flowers on 6 protogynous trees and *ca.* 60 ♀ flowers on 6 protandrous trees, were isolated and kept so for a month, when glycerine slides failed to show any pollen. On July 10, 36 fruits had formed on the protogynous, and none on the protandrous trees. The same difference was found in selfing trials, the selfed protogynous trees forming fruits from *ca.* 50% of the flowers, whereas the selfed protandrous trees gave none. *Juglans nigra* (grafted on *J. regia*): In 1946 all ♂ flowers were frost-killed and dropped off while the ♀ flowers were still dormant. The same frost had killed both ♂ and ♀ flowers of *J. regia* in the forest. Nevertheless the tree of *J. nigra* under observation bore 34 fruits, from which 19 plants were raised. In 1948 the ♂ flowers of this tree had dropped 10–15 days before the ♀ flowers appeared. The flowers on the lower part of the crown were artificially pollinated with pollen of other species, but not isolated, as no pollen could be detected in the air. Subsequent examination showed that more fruits developed in the top of the tree than in the artificially pollinated portion. It is not very likely that pollen remained on the branches and was viable after 10–15 days, especially as heavy rains fell in the interval. Further studies are to be made.

106. ZARUBIN, A. F. K voprosu o vtorichnom tsvetenii gretskogo orekha. **[On the question of the secondary [summer] flowering of *Juglans regia*.]** *Priroda, Moskva* 38 (10), 1949 (65–7). 2 refs. [Russ.] A.C.P.

Describes and discusses, with photographs and a figure, cases of second flowering of *Juglans regia* in natural stands in S. Kirghizia, similar to those reported by Korovin and Tuychiev [see *For. Abstr.* 11 (No. 973)]. Such cases have been most frequent when the normal flowers have been killed by late frosts.

107. WAISMAN, I. El estacado, método económico para la producción de árboles para la chacra. **[Growing from cuttings, an economical method of raising trees for the farm.]** *Alm. Minist. Agric. Argent.* 24, 1949 (167–8). [Span.] A.P.B.

Brief instructions for propagating by means of cuttings.

108. DELGADO, R. F. **Rooting side-branch cuttings.** *Rep. fed. Exp. Sta. Puerto Rico* 1949 (24).

An experiment was made in the vegetative propagation of Bamboo by side-branch cuttings, using several rooting media, two plant growth regulators (α-naphthylacetamide and indolebutyric acid) and two degrees of light. Riverbank soil and sand were the best rooting media; the hormone treatments had no significant effect; shaded cuttings rooted better than those in direct sunlight.

109. SLANKIS, V. **Effect of α-naphthaleneacetic acid on dichotomous branching of isolated roots of *Pinus sylvestris*. (A preliminary report.)** *Physiol. Plant., Copenhagen* 3 (1), 1950 (40–4). 10 refs. [E.]

The addition of α-naphthaleneacetic acid to the nutrient solution in which isolated Pine roots were maintained, produced the following changes in 45 days:—(1) a dichotomous branching of the short roots; (2) shortening of the root branches as the concentration of acid was increased; (3) formation of many short, single roots. [Cf. *For. Abstr.* 11 (No. 2527).]

110. SHAPIRO, S. **Reversal of polarity in regenerated roots on stem cuttings of *Populus*.** *Amer. J. Bot.* 36 (10), 1949 (803). [University of Michigan, Ann Arbor.] O.B.D.

Cuttings of *Populus nigra* var. *italica* were partially immersed in water or 2% sucrose solutions, some in the normal polar position, and others inverted, with the apical end

immersed. All developed roots, both in solutions and in the moist air above the liquid. Of the roots on the cuttings in the normal position 90% grew down, 4% up and 6% straight out. On the inverted cuttings 90% of roots grew up, 5% down and 5% straight out. It is suggested that the direction of growth of the roots is principally determined by the polar orientation of the cuttings from which they arose.

111. KÜNNING, H. Untersuchungen über die Wirkstoffregulation der Kambiumtätigkeit. **[The regulation of cambium activity by growth substances.]** *Planta* 38 (1), 1950 (36–64). 15 refs. [G.g.] [Staatsinstitut für Allgemeine Botanik, Hamburg.] O.B.D.

Extracts of the cambium, fruits, and leaves of *Tilia ulmifolia*, were among a variety of synthetic and natural growth substances tested on certain plants to observe their effects on cambium activity. The tests indicated that a variety of growth substances are necessary to stimulate natural cambium formation and activity.

12.11.3. *Heredity. Breeding. Hybridization. Races and Questions of Provenance. Cytology*

See also *For. Abstr.* 12 (Nos. 103, 181, 201, 390).

112. CLEMENTS, F. E., MARTIN, E. V., and LONG, F. L. **Adaptation and origin in the plant world: the role of environment in evolution.** Chronica Botanica Co., Waltham, Mass.; Wm. Dawson and Sons, Ltd., London, W.C.2. 1950. pp. xii + 332. Many refs. Price $6.00.

113. FISCHER, F. Ziele und Grenzen der Züchtung bei Waldbäumen. **[The aims and limits of forest tree breeding.]** *Schweiz. Z. Forstw.* 101 (5), 1905 (209–23). 33 refs. [G.f.]

A review of general principles and methods.

114. KOSTOFF, D. **Induction of cytogenetic changes and atypical growth by hexachlorocyclohexane.** *Science* 109 (2806), 1949 (467–8). O.R.S.

At the Institute of Applied Biology and Organic Development, Academy of Sciences, Sofia, seedlings of a number of agricultural crop plants (maize, wheat, vetches, cabbage etc.) were treated with insecticides containing the γ isomer of 666. Cytological studies of the affected root, stem, and coleoptile tissues show that the agents act first upon the cytoplasm and interfere with the cytoplasmic processes involved in the formation of achromatic figures. The chromosomes do not arrange in an equatorial plate after prophase, but remain scattered. They appear less bent than usual. The thickening of the chromosomes and their reproduction and splitting proceed, regardless of the fact that the processes involved in the formation of achromatic figures are highly disturbed or even entirely inhibited. Poles are not formed. After reproduction the chromatolytic processes proceed, and a nucleus is formed containing twice as many chromosomes as at the start of the abnormal mitotic process. Since the insecticide continues to act, the next abnormal mitosis ends with a second chromosome doubling, and so on. Thus tetraploid and octoploid cells, and cells of a much higher polyploid degree are formed. The effect of 666 is so striking that it might well be used as a polyploidizing agent, especially as it is much cheaper than other such agents.

115. SAMPATH, S., and RAMANATHAN, K. **Chromosome numbers in Indian economic plants—III.** *Curr. Sci.* 18 (11), 1949 (408–9). 2 refs. [Agricultural Research Institute, Coimbatore.] A.P.B.

116. ALMEIDA, J. L. FERREIRA DE. Sobre a cariologia de *Prunus lusitanica* L. **[A cytological study of *P. lusitanica*.]** *Agron. lusit.* 9 (2), 1947 (129–40 + 5 photos). 15 refs. [Port.e.]

117. SCHMUCKER, T. Physiologische Unterschiede zwischen grünen und bereiften Sippen von Abietaceen. **[Physiological differences between *viridis* and *glauca* varieties of Abietaceae.]** *Biol. Zbl.* 67 (1/2), 1948 (65–71). [G.g.e.f.russ.] [Institut für Forstbotanik der Universität Göttingen.] E.M.B.

Experiments to study the transpiration differences in *viridis* and *glauca* varieties of *Pseudotsuga taxifolia* and *Picea pungens* showed that they were slight. With *Picea glauca*, however, an intensely 'blue' variety showed almost twice the amount of transpiration of a 'green' one.

118. ALLEGRI, E., and MORANDINI, R. Prime notizie sui risultati in Italia delle

esperienze internazionali sulle razze del pino silvestre. [**Preliminary report on the results in Italy of the international provenance tests on *Pinus sylvestris*.**] *Ann. Sper. agr.* (*n.s.*) 3 (4), 1949 (993–1027). 7 refs. [It.it.e.] C.G.B.

The Italian Forestry Experiment Station, Florence, participates in the international researches on the races of Scots Pine that were planned in 1938 by the International Union of Forest Research Organizations [cf. *For. Abstr.* 3 (109); 10 (No. 1802)]. The experimental plots were established in 1941 in two localities of the Lombard 'brughiera' (province of Comò) where Scots Pine grows naturally and is of great silvicultural importance. Seed of Central and East-Central European provenance has given the best results. The Northern European, French and Swiss sources have proved unsuited to Italian conditions.

119. KRUPENIKOV, I. A. Ekologo-biokhimicheskie osobennosti 'solonchakovoy' sosnȳ kak resultat ee prisposobleniya k zasoleniyu pochvȳ. [**Ecological-biochemical peculiarities of the solonchak Pine resulting from its adaptation to soil salinity.**] *Dokl. Akad. Nauk SSSR* 56 (6), 1947 (655–8). 8 refs. [Russ.] A.P.B.

Refers briefly to a previous paper of the author's, reporting the occurrence in the outlying blocks of forest in N.W. Kazakhstan of a solonchak (saline soil) ecotype of *Pinus sylvestris* that grows successfully on soils having up to 0·213% Cl′, 0·606% SO_4'' and 0·419% Na, and was later found on even more saline soils. The present paper compares the results of needle analyses of this Pine with those for Pine from non-saline soils. The solonchak Pine needles were found to have double the mineral content of those from non-saline areas, and CaO represented 50% of the total ash content. They also showed 3 times the SO_4 content and 16 times the Cl content of the non-saline Pine needles. Analyses are also given of aqueous extracts from the needles. The solonchak Pine again showed far higher contents of Cl, SO_4, Ca, Mg, Na and K, and also of water-soluble organic substances. The needles of this Pine are thicker, brighter green and more succulent, longer lived (5–6 instead of 2–3 years), and their moisture content decreases more slowly from spring towards autumn. No morphological differences from the needles of ordinary Pine were observed. The osmotic pressure of the cell sap in the solonchak Pine was twice that of ordinary Pine.

Natural regeneration has been observed in spite of a Cl content of 1% in the upper soil horizons. Seed of ordinary Pine failed to come up when sown in the same conditions. It is concluded that the high salt resistance of the solonchak Pine is hereditary. [Cf. *For. Abstr.* 11 (No. 1647).]

120. STONE, E. C., and DUFFIELD, J. W. **Hybrids of Sugar Pine by embryo culture.** *J. For.* 48 (3), 1950 (200–1). 5 refs.

Seed obtained in 1947 from the artificial pollination of *Pinus lambertiana* with pollen of *P. armandi*, failed to germinate, and, accordingly, a modified embryo-culture technique was applied to seed obtained in the following year from similar pollination with *P. armandi* and *P. koraiensis* pollen. After soaking for 30 minutes in saturated bromine water, the seed coats, the inner integuments and the remains of the nucellus were removed and the embryos with the surrounding endosperm tissue were then grown in agar until the roots were *ca.* 3 cm. long, when the seedlings were transferred to fumigated soil. This method is of definite value when only a few seeds are available and a high germination % is necessary.

The resulting seedlings in this experiment are probably hybrids, because (*a*) they produced fascicles in the first summer, and (*b*) the dorsal surfaces of the needles are without stomata—both characteristic features of *P. armandi* and *P. koraiensis* but not of *P. lambertiana*.

121. Moss, E. H. **Natural Pine hybrids in Alberta.** *Canad. J. Res.* 27*B* (5), 1949 (218–29 + 9 photos). 18 refs. P.R.

In central and N.W. Alberta, where the ranges of *Pinus contorta* var. *latifolia* and *P. banksiana* overlap, there is abundant field evidence of hybridism between these species. Various diagnostic characters for the species are briefly evaluated for interpreting the polymorphic hybrid population. Characters of the mature seed cones are used to distinguish several Pine types in the region and as a basis for a discussion of problems requiring further investigation. *From author's summary.*

122. ALMEIDA, J. L. FERREIRA DE. Um híbrido espontâneo de *Castanea crenata* Sieb. Zucc. (var. *siba-kuri*) e *C. sativa* Miller (var.

longal). Nota preliminar. [**A spontaneous hybrid between *C. crenata* Sieb. et Zucc. (var. *siba-kuri*) and *C. sativa* Miller (var. *longal*). Preliminary note.**] *Agron. lusit.* 9 (5), 1947 (265–75 + 1 plate). 8 refs. [Port. port.e.]

Morphological and cytological studies proved the spontaneous form to be a hybrid. The F_2 generation showed a segregation of the characteristics of the progenitors and the seedlings showed a diversity of morphological characteristics, ranging between those of *Castanea crenata* and those of *C. sativa*. Some of the F_2 generation proved highly resistant to the ink-disease fungus *Phytophthora cambivora*.

123. McKay, J. W. **Heterosis in Chestnuts.** *Abstr.* in *Genetics, Menasha* 33, 1948 (116). [U.S.D.A. Plant Industry Station, Beltsville.] O.R.S.

A 10-year study of heterosis in Chestnuts (*Castanea* sp.) has shown that hybrid vigour may be expressed in the embryo of the seed, as evidenced by increased nut size, or at later stages in the growth and development of the seedling and young tree. The work was carried on with varieties and seedlings of *C. mollissima* and *C. crenata*. Certain F_1 interspecific hybrid seedlings are much more vigorous than seedlings of either parent, while other hybrids fail to show hybrid vigour. In most instances, F_1 hybrid nuts that were larger as a result of heterosis than nuts of the parents, produced seedlings which were more vigorous than those of either parent, though exceptions occurred. Since all species of Chestnut are cross-pollinated and the individuals are presumably highly heterozygous, it is likely that heterosis will be expressed differently in each cross, depending upon the genotype of the parents.

124. Vloten, H. van. Het veredelingswerk begonnen. [**Selection and breeding started.**] *Korte Meded. Bosbouwproefsta. T.N.O., Wageningen* No. 3, 1949. pp. 16 [Du.e.]

Describes, with photographs, the start made in 1949 by the Forestry Research Station, Wageningen, on Poplar breeding. Flowering branches from ♀ trees are bottle-grafted on to small stocks in pots and grown for seed production in special pollination chambers in the greenhouse, the chambers having a filtered ventilation system which excludes unwanted pollen. A good seed set has been obtained from the controlled pollinations so far made. The seed is collected as soon as it is ripe, and sown on plates of compressed peat, from which the seedlings are pricked out to a special soil mixture in seed-pans and thence, when large enough, to small flowerpots. In these pots they are transferred to frames, to be hardened off before being put out to the nursery beds. The number of seedlings raised in 1949 will be almost 8,000.

12.13. Embryology

125. Rao, C. V. **Contributions to the embryology of Sterculiaceae—I.** *J. Indian bot. Soc.* 28 (3), 1949 (180–97). 12 refs. [Andhra University, Waltair.] O.B.D.

126. Spurr, A. R. **Histogenesis and organization of the embryo in *Pinus strobus* L.** *Amer. J. Bot.* 36 (9), 1949 (629–41). 62 refs. [College of Agriculture, Davis, Calif.] O.B.D.

127. Ferré, Y. de. Cotylédons et évolution chez les Taxodinées. [**Cotyledons and evolution in the Taxodieae.**] *Trav. Lab. for Toulouse* 1 (4) Art. 21, 1947. pp. 10 + 1 dgm. [F.] *Repr.* from *Bulletin de la Société d'Histoire Naturelle de Toulouse* 82, 1947.

A detailed morphological and anatomical study which shows the genera *Taxodium*, *Glyptostrobus* and *Wellingtonia* to be closely related, and indicates that the Taxodieae are more highly developed than the Abieteae and more primitive than the Cupresseae.

128. Troll, W. Über die Gestaltung der Kotyledonen von *Tilia* und *Lepidium sativum*. [**The morphology of the cotyledons of *Tilia* and *L. sativum*.**] *Planta* 38 (1), 1950 (12–35). 10 refs. [G.] [Botanisches Institut der Universität Mainz.] O.B.D.

12.14. Organography. Morphology. Anatomy. Histology

See also *For. Abstr.* 12 (Nos. 60, 127–8, 185–7, 354, 358–60, 723).

129. Esau, K. **Development and structure of the phloem tissue. II.** *Bot. Rev.* 16 (2), 1950 (67–114). 130 refs.

A review of developments in the concepts

and terminology of phloem tissue, supplementing a previous review published in 1939. [Cf. *For. Abstr.* 1 (144).]

130. ARMENISE, V. Primi stadi di differenziazione del fellogeno in giovani rametti di ulivo. **[Early stages of phellogen differentiation in young Olive branches.]** *Nuovo G. bot. ital. (n.s.)* 56 (3), 1949 (357–65). [It.it.e.] A.P.B.

131. BALL, E. **Differentiation in a callus culture of *Sequoia sempervirens*.** *Abstr.* in *Amer. J. Bot.* 36 (10), 1949 (793). [University of North Carolina, Raleigh.] O.B.D.

Callus was obtained from both ends of 1-cm.-long pieces of stem grown in agar medium. After excision of the callus and its inoculation into fresh medium, growth was continuous. Transplants were made at intervals of 2 months.

132. FITTING, H. Weitere Beobachtungen über die Induktion der Dorsiventralität in dem blattartigen Zweigsystem von Cupressaceen. **[Further observations on the induction of dorsiventrality in the leaf-like twig systems of Cupressaceae.]** *Planta* 37 (5), 1950 (676–96). 10 refs. [G.g.] O.B.D.

Dorsiventrality is brought about in certain species through one-sided insolation.

133. BULARD, C. Les canaux résinifères de la feuille de *Picea omorica*. **[The resin ducts of the leaves of *P. omorica*.]** *Trav. Lab. for. Toulouse* 1 (4) Art 29, 1948. pp. 4. 6 refs. *Repr.* from *Bulletin de la Société d'Histoire Naturelle de Toulouse* 83, 1948.

134. MAJUMDAR, G. P., and MITRA, G. C. **The origin and development of stipules in *Morus alba* Linn.** *Bull. bot. Soc. Bengal.* 2 (2), 1948 (178–85). 22 refs. O.B.D.

135. HALL, B. A. **The floral anatomy of the genus *Acer*.** *Abstr.* in *Amer. J. Bot.* 36 (10), 1949 (797). [State Teachers College, Cortland, N.Y.] O.B.D.

136. CANRIGHT, J. E. **Pollen morphology of the Magnoliaceae.** *Abstr.* in *Amer. J. Bot.* 36 (10), 1949 (795–6). [Indiana University, Bloomington.] O.B.D.

137. MILLINGTON, W. F., and GUNCKEL, J. E. **Structure and development of the vegetative shoot tip of *Liriodendron tulipifera* L.** *Abstr.* in *Amer. J. Bot.* 36 (10), 1949 (800). O.B.D.

138. ROUFFA, A. S., and GUNCKEL, J. E. **Shoot development in the Rosaceae.** *Amer J. Bot.* 36 (10), 1949 (802). O.B.D.

139. SWAMY, G. L. **The comparative morphology of the Santalaceae: node secondary xylem, and pollen.** *Amer. J Bot.* 36 (9), 1949 (661–71). [Harvard University.] O.B.D.

12.19. Geographical Distribution. Plant Geography and Sociology

See also *For. Abstr.* 12 (Nos. 219, 222, 238, 693).

140. DANSEREAU, P. Introdução à biogeografia. **[Introduction to biogeography.]** *Separate* from *Revista Brasileira de Geografia, Rio de Janeiro* 11 (1), 1949 (3–92) Numerous refs. [Port.f.span. esper. ital. g.e.

141. HU, H.-H. ***Taiwania*, the monarch of Chinese conifers.** *J. N.Y. bot. Gdn.* 5 (603), 1950 (63–7).

In February 1948, during a field study of *Metasequoia*, a grove of a score or more of giant *Taiwania* was discovered growing at an altitude of 2,800 ft. in western Hupeh. The tree is the same species as that found in Yunnan, i.e. *T. flousiana*. The discovery extends considerably the known range of *Taiwania*, and shows it to be adaptable to quite widely differing ecological environments

142. CHANEY, R. W. **Redwoods—occidental and oriental.** *Science* 110 (2865) 1949 (551–2). [University of California.] O.R.S.

During Cretaceous times and at the beginning of the Tertiary period *Metasequoia* was abundant at high northern latitudes, but, with gradual reduction in rainfall and temperature, it is recorded for successively more southerly stations. Near the end of the Tertiary period it became extinct in North America, as the result of a shift to winter rainfall and summer drought. It now only exists in the interior of China, where heavy summer rainfall is combined with moderate temperatures.

143. CHU, K., and COOPER, W. S. **An ecological reconnaissance in the native**

home of *Metasequoia glyptostroboides*. *Ecology* 31 (2), 1950 (260–78). 66 refs.

Climatic changes are thought to be one of the reasons for the restriction of *Metasequoia* to the area of *ca.* 800 sq. km. where it occurs naturally. Soil character and moisture conditions and microclimate cause a further limitation within this area. The tree prefers moist, slightly acid or circumneutral soils derived from sandstone, and a humid atmosphere. It avoids soils of limestone origin. The presence of scattered individuals growing beyond the confines of the Shui-hsa valley points to the existence of conditions similar to those of the valley in the recent past, conditions which were probably destroyed as the human population increased and the natural resources of the area were exploited. That *Metasequoia* still exists in the Shui-hsa valley under approximately its normal conditions is probably partly due to the fact that the valley was the last in this region to be occupied by permanent settlers. A '*Metasequoia* Conservation Committee' has been formed in China, and will, it is hoped, preserve the natural stands.

144. PEDRO, J. G. **On the importance of the Leguminosae in Mozambique.** *Abstr.* in *S. Afr. J. Sci.* 45, 1949 (99). A.P.B.

The author outlines the distribution of the main types of vegetation in which the Leguminosae play an important part, gives some examples of correlation between climate and soil and certain genera and species, and presents a provisional list of the Leguminosae of Mozambique.

145. ROBYNS, W. Les connaissances actuelles en botanique congolaise. **[The present state of knowledge of botany in the Congo.]** Imprimerie Marcel Hayez, 112 Rue de Louvain, Brussels. 1949 (153–94 + 24 photos). 88 refs. [F.]

A review of the areas for which botanical and/or ecological information is available. [Cf. *For. Abstr.* 12 (Nos. 146, 163–6).]

12.19.1. *Regional Floras, including Check Lists*

146. ROBYNS, W. Flore des Spermatophytes du Parc National Albert: Vol. I. Gymnospermes et Choripétales. **[The spermatophytic flora of the Albert National Park [Belgian Congo]: Vol. I. Gymnospermae and Choripetalae.]** Institut des Parcs Nationaux du Congo Belge, Brussels. 1948. pp. 745 + 1 plate, 1 map.

147. PRESTON, R. J. **North American trees.** Iowa State College Press, Ames, Iowa. 1948. pp. lv + 372. Price $4.00.

Many drawings, diagrams and keys. A handbook designed for field use. Excludes Mexico and tropical U.S.A.

148. STANDLEY, P. C., and STEYERMARK, J. A. **Flora of Guatemala. VI.** *Fieldiana* (*Bot.*) 24 (6), 1949. pp. 440.

149. STEHLÉ, H., STEHLÉ, M., and QUENTIN, L. Flore de la Guadeloupe et dépendances et de la Martinique. Tome II. Catalogue des phanérogames et fougères avec contribution à la flore de la Guyane française. Fasc. 2. **[The flora of Guadeloupe and its dependencies and Martinique. Vol. II. Catalogue of the phanerogams and ferns, with a contribution on the flora of French Guiana. Fasc. 2.]** Imprimerie Clément Brunel, 18 Rue Dom-Vaissette, Montpellier. 1948. pp. xvi + 140. [F.]

This fascicle covers the dicotyledons Piperaceae to Papilionaceae inclusive. Fascicle 1, published in 1937, dealt with Ranunculaceae to Polygonaceae.

150. EGLER, F. E. **Regional vegetation literature. III. Massachusetts.** *Phytologia* 3 (5), 1950 (193–237). L.S.

A bibliography of 304 references to literature on the vegetation of Massachusetts, dated from 1833 to the present day, arranged under State Floras, General, and Localities, and an author index.

151. ANDERSON, R. H. **The trees of New South Wales.** New South Wales Department of Agriculture. 2nd ed., 1947. pp. xxv + 453 + map. Price 17*s.* 6*d.*

The present edition has been enlarged and revised, and keys for the identification of species of *Eucalyptus* and *Acacia* have been added.

12.19.2-3. *Vegetation Types*

See also *For. Abstr.* 12 (Nos. 24–7, 43–4, 66, 205, 219, 238, 300, 839).

152. FENTON, E. W. **The vegetation of**

an Oak wood near Dinnet Bridge (Aberdeenshire). *Scot. For.* 4 (1), 1950 (13–6). 9 refs.

153. NOIRFALISE, A. **Premier aperçu sur l'étage du hêtre et les types de hêtraies en Haute Ardenne. [Preliminary survey of the altitudinal distribution of Beech and types of Beech stand in the Upper Ardennes.]** *Bull. Inst. agron. Gembloux* 17, 1948–9 (76–100). 13 refs. [F.flem.g.e.] E.M.B.

154. MURANSKÝ, S. Přirozená společenstva středočeských chlumů. **[Natural plant communities of the central Bohemian hills.]** *Zpr. výzkum. Úst. lesn. ČSR* No. 2, 1948 (76–100). [Cz.russ.e.] [Ústav les. dendrologie a geobotaniky, Prague.]

Discusses: (1) the region in general, its site conditions and vegetational history, with emphasis on the desirability of restoring the natural equilibrium lost where large-scale pure coniferous plantations have been made on essentially deciduous-forest sites. (2) The fundamental notions of plant sociology and the importance of this subject as the basis of silviculture. (3) The chief natural units of forest vegetation, all of which fall under Braun-Blanquet's mesophytic deciduous forest, of which the following subdivisions are recognized:—*Alnion glutinosae*, *Fraxino-Carpinion*, *Eu-Fagion*, *Quercion roboris sessiliflorae* and *Betuleto-Quercetum*, and *Quercion pubescentis*. Lesser and successional communities and their characteristic species are also discussed. It is emphasized that the artificial origin of most of the existing woodland makes it impossible to determine the finer synecological subdivisions on a sufficient scale for practical use in forestry. This, however, by no means prevents practical use of the higher ecological units distinguished, and of the principles of plant sociology, as guides to the re-establishment and maintenance of more natural forest vegetation. [Cf. *For. Abstr.* 12 (No. 839).]

155. AMBROŽ, J. **Lesy třeboňské pánve a přilehlých okrsků. [The forests of the Třeboň basin and neighbouring districts.]** *Zpr. výzkum. Úst. lesn. ČSR* No. 2, 1948 (101–80). 39 refs. [Cz.russ.e.] [Ústav les. dendrologie a geobotaniky, Prague.]

Gives a brief general review of the region, its geology, soils and climate, followed by notes on:—(1) Past and present distribution of the individual woody species. (2) The general outlines of the forest history of the region. (3) Characteristic species of the ground flora of the individual forest communities recognized. (4) The broad natural forest communities, according to the Braun-Blanquet school of classification. Detailed ecological analysis of the units of lower rank is not possible, since the natural vegetation is now represented for the most part by disturbed and fragmentary relicts. As a region, the territory belongs to the *Querceto-Fagetales*, with *Vaccinio-Piceetales* on the fairly extensive peat areas and on small areas on the wet slopes and at their feet in the higher parts of the Novohradské Hory. The communities discussed are the *Abieto-Quercetum hercynicum*, *A.Q. h. pinetosum*, and *A.Q. h. fagetosum* (all of the *Quercion roboris sessiliflorae*); the *Eu-Fagion*; the *Querceto-Carpinetum* and *Acereto-Carpinetum* (of the *Fraxino-Carpinion*); the *Alnion glutinosae*; and the *Pinetum uncinatae* (of the *Vaccinio-Piceion*).

156. KARPÍNSKI, J. J. Materialy do bioekologii puszczy Białowieskiej. **[Contributions to the bioecology of the virgin forest of Białowieża.]** *Rozpr. Spraw. Inst. Bad. Leśn.* No. 56, 1949. pp. 212 + 28 plates + 2 dgms. Numerous refs. [Pol.pol.russ.e.]

157. NEVES, C. M. BAETA. A flora lenhosa dos pinhais (matos e arbustos). **[The woody flora in Pine stands (shrubs and woody plants).]** *Pinhal e Resina* 2 (8), 1949 (44–50). 10 refs. [Port.]

158. SVOBODA, P. Přínos sovětské vědy k lesní typologii. **[The contribution of Soviet research to the science of forest types.]** *Lesn. Práce* 28 (11/12), 1949 (453–531 + 1 tbl.). [Cz.]

A critical review of the literature (of which no formal bibliography is offered, references being confined to mentions of authors' names and dates of publication, scattered throughout the text).

159. WALTER, H. Die Vegetation Osteuropas unter Berücksichtigung von Klima, Boden und wirtschaftlicher Nutzung. **[The vegetation of Eastern Europe [i.e. Russia], with reference to climate, soil, and economic utilization.]** Paul Parey, Berlin.

2nd ed. (rev.), 1943. pp. 180 + 8 plates + 1 coloured map. Many refs. in footnotes. [G.]

160. BOYKO, H. **On the climax-vegetation of the Negev with special reference to arid pasture problems.** *Repr.* from *Palestine Journal of Botany* (*Rehovot Series*), 7, 1949 (17–35 + 11 photos). 10 refs. X.

An attempt is made to set up a biological scale of degrees of aridity by plant indicators. [Cf. *For. Abstr.* 9 (No. 2094).]

161. BOYKO, H. **On climatic extremes as decisive factors for plant distribution.** *Repr.* from *Palestine Journal of Botany* (*Rehovot Series*) 7, 1949 (41–52). 10 refs. X.

The thesis is substantiated by evidence from the Judaean desert and the Negev. The importance of the frequency as well as the intensity of climatic extremes is emphasized. [Cf. *For. Abstr.* 9 (No. 2094).]

162. GORCHAKOVSKI, P. L. Sosnovÿe lesa Priob'ya kak zonal'noe botaniko-geografi-cheskoe yavlenie. [**Ecological zonation of the Scots Pine forests of the Ob basin.**] *Bot. Zh. SSSR* 34 (5), 1949 (524–38). 18 refs. [Russ.russ.] P.R.

Discusses the zonation of Pine [*Pinus sylvestris*] forests, from taiga types in the north through transitional types to forest-steppe types in the south, and the adaptations of the various associations represented to the zones in which they are found. The individual associations are briefly described, their floristic composition is tabulated, and a diagram is given of their probable relationships. A sketch-map illustrates the distribution of the forests by broad zones. The isolated blocks of Pine forest in the forest-steppe region are apparently relicts from a colder period.

163. ROBYNS, W. Atlas général du Congo: Les territoires phytogéographiques du Congo belge et du Ruanda-Urundi. [**General atlas of the Congo: the phytogeographical regions of the Belgian Congo and Ruanda-Urundi.**] Institut Royal Colonial Belge, Brussels. 1948. pp. 10 + 10 + map. 16 refs. [F.Flem.]

A survey of the principal vegetation types. [Cf. *For. Abstr.* 12 (Nos. 145–6, 876).]

164. ROBYNS, W. Les territoires biogéographiques du Parc National Albert. [**The biogeographical regions of the Albert National Park.**] Institut des Parcs Nationaux du Congo Belge, Brussels. 1948. pp. 51 + map. 60 refs. [F.]

A survey of the principal vegetation types. [Cf. *For. Abstr.* 12 (No. 146).]

165. DUVIGNEAUD, P. Sur la présence du 'Mukue' (*Cryptosepalum pseudotaxus* Bak. fil.) et de deux copaliers dans le Katanga occidental. [**The occurrence of *Cryptosepalum pseudotaxus* and two species of *Copaifera* in western Katanga.**] *Bulletin de la Classe des Sciences, Académie Royale de Belgique* (Ser. 5) 35 (7), 1949 (671–4). 6 refs. [F.] L.S.

The vegetation of western Katanga differs from that of eastern Haut Katanga both in its general aspect and its composition. Notable features are pure stands of *Cryptosepalum pseudotaxus*, and savanna with clumps of *Erythrophleum africanum*, a rich shrub layer of *Copaifera coleosperma* and occasional thickets of *C. baumiana*. In these respects it is much more like the vegetation of Angola and Northern Rhodesia.

166. DUVIGNEAUD, P. Le 'Mulombe' du Kwango (*Daniella alsteeniana* Duvigneaud) et le mode de distribution Kwango-Katangais au Congo belge. [***D. alsteeniana* and the Kwango-Katanga type of distribution in the Belgian Congo.**] *Bulletin des Séances de l'Institut Royal Colonial Belge, Brussels* 20 (3), 1949 (677–89). [F.] L.S.

Affirms the existence of a type of vegetational distribution which may be termed Kwango-Katanga and which is exemplified by the distribution of *D. alsteeniana* and other species belonging to the Sudan-Zambesi vegetational region.

167. RAYMOND, M. Esquisse phytogéographique du Québec. [**An outline of plant distribution in Quebec.**] *Mémoires du Jardin Botanique de Montréal* No. 5, 1950. pp. 147 + 8 plates. Numerous refs. [F.] O.B.D.

168. QUARTERMAIN, E. **Ecology of Cedar glades. I. Distribution of glade flora in Tennessee.** *Bull. Torrey bot. Cl.* 77 (1), 1950 (1–9). 24 refs. O.B.D.

169. QUARTERMAN, E. **Major plant communities of Tennessee Cedar glades.**

Ecology 31 (2), 1950 (234–54). 13 refs. [Vanderbilt University, Nashville.]

170. WILLIAMS, A. B. **The native forests of Cuyahoga County, Ohio.** Cleveland Museum of Natural History, Cleveland, Ohio. 1949. pp. 90. 39 refs. *Bulletin of the Holden Arboretum* No. 1.

171. MARKS, J. B. **Vegetation and soil relations in the Lower Colorado desert.** *Ecology* 31 (2), 1950 (176–93). 14 refs. [University of California.]

The desert is divided into 4 physiographic provinces. The valleys have alluvial soils of all textures, many of them saline. The mesas have mixed alluvial/colluvial soils mostly of sandy textures. The bajadas, or mountain pediments, have cemented gravelly or coarse sandy soils of colluvial or residual origins, and the mountains have rough, broken lands of residual rock with only pockets of soil development. The desert is within the region of the desert scrub formation. In the valley 4 communities are described, dominated respectively by *Prosopis*, by *Pluchea* and *Tamarix*, by species of *Atriplex*, and by salt shrubs. The *Prosopis* community has 2 sub-communities in which *Prosopis* shares dominance with *Suaeda* and with *Atriplex* respectively. Within the *Pluchea-Tamarix* community are 2 societies typical respectively of sandy and clayey soils. The salt-shrub community includes 2 sub-communities, one dominated by *Suaeda* and one by *Allenrolfea*. The *Allenrolfea* community is the most saline and the *Atriplex* and *Pluchea/Tamarix* communities the least saline in the valley. Least moisture-retaining power was shown by soils under *Acacia greggii* and *Coldenia palmeri*, while soils under *Fouquieria* and *Larrea/Atriplex* have significantly the highest values for moisture retention observed among the sandy soils. *From author's summary.*

172. ZACH, L. W. **A northern climax, forest or muskeg?** *Ecology* 31 (2), 1950 (304–6). 1 ref. [Alaska Forest Research Centre, Juneau.]

Discusses the possibility of muskeg representing a physiographic climax in parts of southeastern Alaska.

173. VELOSO, H. P. A vegetação no município de Ilhéus, Estado da Bahia. I: Estudo sinecológico das áreas de pesquisas sôbre a febre amarela silvestre realizado pelo S.E.P.F.A. II: Observação a ligeiras considerações acêrca de espécies que ocorrem na região. Chave analítica das espécies arbóreas. III: Caracterização da vegetação pelo valôr dos índices das espécies. [**The vegetation of the Ilheus region, State of Bahia. I: Ecological study of the area covered by the S.E.P.F.A. in its research on yellow fever. II: A list of and brief notes on the species found in this area. Analytical key to the tree species. III: Determining the characteristics of the vegetation by the index value of the species.**] *Memórias do Instituto Oswaldo Cruz, Rio de Janeiro* 44 (1; 2), 1946 (13–103; 221–93, 323–41). 7 + 6 + 6 refs. [Port.e.] I.I.E.

174. AUBRÉVILLE, A. A floresta de pinho do Brasil. [**The *Araucaria* forests of Brazil.**] *Brasil madeireiro* 5 (58), 1949 (8–14, 47). [Port.]

Distribution, ecology and timber production.

175. PAREDES C., A. Anotaciones acerca de la vegetación y la flora de la hoya de Tulcán. [**The vegetation and flora of the Tulcan basin.**] *Boletín del Instituto Botánico de la Universidad Central, Quito* 8 (8), 1949 (39–56 + 3 plates). [Span.] L.S.

176. SARLIN. La forêt et le sol du nord de Santo (Nouvelles Hébrides). [**The forest and soil of the north of Santo (New Hebrides).**] *Bois For. Trop.* No. 13, 1950 (4–13). [F.e.span.]

In spite of their tropical climate, the New Hebrides are covered only by low forms of vegetation, only a few of which deserve the name of forest. This is explained by the youngness of the soils, of which a brief survey is given. The author lists some 30 species of trees and gives their distribution. The only one which forms pure, climax stands is 'Na Atsa' (*Castanospermum australe*), the distribution, silvicultural characters and uses of which are briefly described. Its possible exploitation is discussed.

177. BEADLE, N. C. W. **The vegetation and pastures of Western New South Wales, with special reference to soil erosion.** Department of Conservation of New South Wales. 1948. pp. 281 + map. 89 refs. Price 25*s*.

Deals with a large tract (150,000 sq. m.) of western New South Wales. The book is divided into 14 chapters, which give an

historical sketch, a brief account of the physiography, geology and climate of the area, a discussion on the relationship between soils and vegetation and the use of plant indicators, a chapter on the causes and results of erosion and suggested remedial measures, and a systematic account of the plant communities, their distribution, floristic composition, pastures, soils, and erosion. The final chapter is devoted to an academic discussion on the primary plant successions, the status of the climaxes, and the interrelationship of the plant communities. *From author's preface.*

178. PAPY, R. Aperçu sommaire des étages de végétation à Tahiti. **[Brief outline of the vegetation belts of Tahiti.]** *Trav. Lab. for. Toulouse* 5 (1) Art. 1, 1948. pp. 6. 9 refs. [F.] *Repr.* from *Bulletin de la Société d'Histoire Naturelle de Toulouse* 83, 1948.

12.2. *Special (Systematic) Botany*

12.21. Fungi

See also *For. Abstr.* 12 (Nos. 294–9, 703 *et seq.*).

179. FOSTER, J. W. **Chemical activities of the fungi.** Academic Press Inc., New York, N.Y. 1949. pp. 648. Numerous refs. P.R.

[Cf. *For. Abstr.* 12 (Nos. 394–9).]

180. IMAZEKI, R. **Contributions to the fungus flora of Eastern Asia. I.** *Bull. For. exp. Sta., Meguro, Tokyo* No. 42, 1949 (1–10 + 1 plate). [Jap.e.]

Includes descriptions (illustrated) of two new species:—(1) *Fomitopsis castanea* (hitherto misreferred to *Fomes melanoporus* in Japan) on living broadleaved trees, especially *Castanea crenata* and *Quercus aliena* and (2) *Cryptoderma cercidiphyllum* on living *Cercidiphyllum japonicum.*

181. VLOTEN, H. VAN. Kruisingsproeven met rassen van *Melampsora larici-populina* Klebahn. **[Crossing experiments with strains of *Melampsora larici-populina*].** *Mededeling, Instituut voor Phytopathologie, Laboratorium voor Mycologie en Aardappelonderzoek, Wageningen* No. 121, 1949. pp. [14]. 5 refs. [Du.e.] *Repr.* from *Tijdschrift over Plantenziekten* 55, 1949 (196–209).

12.25-9. Spermatophyta

182. BEAN, W. J. **Trees and shrubs hardy in the British Isles. Vol. 1. A–E.** John Murray, London. 7th ed. (revised) 1950. xviii + 722 + 40 photos. Price £2. 2*s.*

12.25. Gymnosperms

See also *For. Abstr.* 12 (Nos. 127, 293, 390).

183. BORDÈRES-REY, O., and GAUSSEN, H. Deux espèces nouvelles de sapin chinois: *Abies rolii* et *A. yuana.* **[Two new Chinese species of Fir: *A. rolii* and *A. yuana.*]** *Trav. Lab. for. Toulouse* 1 (4) Art. 26, 1948. pp. 6 + 1 dgm. 2 refs. *Repr.* from *Bulletin de la Société d'Histoire Naturelle de Toulouse* 83, 1948.

184. CORNMAN, J. F. **[Taxonomic] studies in the genus *Juniperus.*** *Abstracts of Theses, Cornell University, Ithaca, New York, 1947,* 1949 (443–5). C.G.B.

185. PLACE, I. C. M. **The identification of Spruce seedlings.** *Silv. Leafl. For. Br. Can.* No. 40, 1950. pp. 2. 1 ref.

The margins of the juvenile needles of Red, Black, and Sitka Spruce are smooth, while those of White and Norway Spruce are usually serrulate with fine teeth on each of the four corners of the needle.

186. FERRÉ, Y. DE. Quelques particularités anatomiques d'un pin indochinois: *Pinus krempfii.* **[Some anatomical features of a Pine of Indo-China—*P. krempfii.*]** *Trav. Lab. for. Toulouse* 1 (4) Art. 25, 1948. pp. 6 + 1 dgm. 7 refs. [F.] *Repr.* from *Bulletin de la Société d'Histoire Naturelle de Toulouse* 83, 1948.

An anatomical and taxonomic study in which are indicated the main differences between *P. krempfii* and other *Pinus* spp.

12.26-8. Dicotyledons

See also *For. Abstr.* 12 (No. 354).

187. MUKHERJEE, S. **The taxonomic value of the anatomical structures of the inflorescence axes of *Mangifera* L.** *J. Indian bot. Soc.* 28 (3), 1949 (162–71). 13 refs. O.B.D.

188. KRUKOFF, B. A., and LETOUZEY, R. Contribution à la connaissance du genre *Strophanthus* au Cameroun français et au Gabon. [**Contribution to research on the genus *Strophanthus* in the French Cameroons and Gabon.**] *Rev. int. Bot. appl. Agr. trop.* 30 (329/30), 1950 (121–38). 7 refs. [F.] P.R.

Gives keys for identification by vegetative characters, flowers and fruit, and information on the distribution, uses and botanical characteristics of *S. gratus*, *S. thollonii*, *S. hispidus*, *S. bullenianus*, *S. sarmentosus*, *S. gracilis*, *S. preussii*, *S. erythroleucus* and *S. congoensis*. [Cf. *For. Abstr.* 11 (No. 3166); 12 (No. 639).]

189. FERNALD, M. L. ***Betula michauxii*, a brief symposium. 1. Introductory note.** *Rhodora* 52 (614), 1950 (25–7). O.B.D.

190. ROUSSEAU, J., and RAYMOND, M. ***Betula michauxii*, a brief symposium. 2. *Betula michauxii* Spach in northeastern America.** *Rhodora* 52 (614), 1950 (27–32 + 1 plate). 14 refs. [Montreal Botanical Garden.] O.B.D.

191. SENAY, P., and JOVET, P. ***Betula michauxii*, a brief symposium. 3. The type of *Betula michauxii*.** *Rhodora* 52 (614), 1950 (32–3). O.B.D.

192. JOHNSTON, I. M. **Studies in the Boraginaceae. XIX.** *J. Arnold Arbor.* 31 (2), 1950 (172–87).

A new genus *Antrophora* is described, with a single species, *A. williamsii*, from Central America. *Antrophora* is closely related to *Lepidocordia*, a monotypic genus of the Amazon Valley, from which it is readily distinguished by its single, well developed style and 4-seeded fruit with a more complicated endocarp.

Several new species of *Cordia* are described in a study of *Cordia* sect. *Gerascanthus* in Mexico and Central America.

193. HOTOVY, R. *Fagus silvatica* L., Rotbuche [**Beech**]. *Pharmazie, Berlin* 3 (11), 1948 (513–23). 110 refs. [G.] L.B.A.

Discusses the distribution, botanical characters, silviculture, and pests of the tree, describes the wood and its uses, and discusses the uses and pharmaceutical properties of leaves, bark and nuts.

194. VICIOSO, C. Revisión del género *Quercus* en España. [**Revision of the genus *Quercus* in Spain.**] [*Bol.*] *Inst. for. Invest. Exp. Madrid* 21 (51), 1950. pp. 194 + 1 plate. Numerous refs. [Span.]

A taxonomic study.

195. HERMANN, F. J. **Studies in *Lonchocarpus* and related genera. V. New species from Middle America and the *Lonchocarpus guatemalensis* complex.** *J. Wash. Acad. Sci.* 39 (9), 1949 (306–13). [U.S. Department of Agriculture.] A.P.B.

Terna, a new genus of the Leguminosae, is described, with one species, *T. vallicola*, a slender tree or tall shrub. *Terna* closely resembles *Willardia* but differs from it in having the wing petals strongly adherent to the keel, the claw of the standard appendaged at the base, pods without resin-ducts and seeds with the hilum bordered by a membranaceous collar. The article also includes descriptions of 4 new species of *Lonchocarpus*: *L. lasiotropis*, *L. venustus*, *L. resinosus* and *L. spectabilis*. [Cf. *For. Abstr.* 11 (No. 163).]

196. JOVET, P. Les *Nuxia* malgaches (sous-genre *Lachnopylis*). [**The *Nuxia* spp. of Madagascar (sub-genus *Lachnopylis*).**] *Trav. Lab. for. Toulouse* 1 (4) Art. 14, 1947. pp. 72. 23 refs. [F.] *Repr.* from *Bulletin de la Société d'Histoire Naturelle de Toulouse* 82, 1947.

197. DUVIGNEAUD, P. Le groupe de *Strychnos malacoclados* Wright en Afrique équatoriale. [**The *Strychnos malacoclados* group in equatorial Africa.**] *Lejeunia, Liége* 11 (3), 1947 (55–79 + 30 drawings. P.R.

Describes 8 species, with their varieties, for which a section Malacocladae is proposed. [Cf. *For. Abstr.* 12 (Nos. 642–3).]

198. PELKWIJK, A. J. TER. *Amelanchier*-soorten in Nederland en hun betekenis voor tuin- en bosbouw. [***Amelanchier* species in Holland and their significance for horticulture and forestry.**] *Mededeling van het Biologisch Station te Wijster* No. 41, 1949. pp. 28. 54 refs. [Du.e.] *Repr.* from *Mededelingen Directeur van de Tuinbouw* 12 (4), 1949 (207–34).

Includes a key to and descriptions of the species, including *A. laevis* f. *villosa* f.nov.

199. MARTIN, F. L. **A revision of *Cercocarpus*.** *Brittonia, N.Y.* 7 (2), 1950 (91–111).

200. CHEVALIER, A. Sur de nouveaux *Teclea* de l'Afrique Occidentale. **[Some new species of *Teclea* from West Africa.]** *Rev. int. Bot. appl. Agric. trop.* 30 (327/8), 1950 (75–8). 4 refs. [F.] P.R.

201. BALL, C. R. **Willow hybrids: *Salix hebecarpa* Fernald and *S. simulans* Fernald.** *Rhodora* 52 (613), 1950 (8–18). O.B.D.

The author concludes that both are hybrids of *S. pedicellaris* var. *hypoglauca* and an unknown species.

202. VIROT, R. Le santal néo-calédonien. **[The *Santalum* species of New Caledonia.]** *Rev. int. Bot. appl. Agric. trop.* 30 (327/8), 1950 (79–86). 10 refs. [F.] P.R.

Discusses the distribution, climatic and soil requirements, properties and economic value of *S. austro-caledonicum.*

203. KOBUSKI, C. E. **Studies in the Theaceae. XIX. The genera *Archytaea* and *Ploiarium*.** *J. Arnold Arbor.* 31 (2), 1950 (196–207).

A botanical study.

204. MELVILLE, R. **The coritanian Elm.** *J. Linn. Soc.* (*Bot.*) 53 (352), 1949 (263–71). O.B.D.

Ulmus coritana, a new English species of Elm, is described, with three varieties: vars. *media, angustifolia* and *rotundifolia*. Its range extends throughout E. Anglia and across the Midlands southwards to the Thames valley and northwards to the Trent valley.

12.29. Monocotyledons

205. HESMER, H., and MEYER, J. Waldgräser. **[Forest grasses.]** M. u. H. Schaper, Hannover. 2nd ed. (rev.), 1950. pp. 122 + 64 plates. 11 refs. [G.]

A concise handbook for foresters, first published in 1940 and now extensively revised, dealing with the more important Cyperaceae and Juncaceae as well as grasses proper. It contains an introductory section on the structure of the three families, a key for identification, descriptions of individual species (grouped by their habitats) accompanied by photographs showing habit and diagnostic features, a review of their ecology and forestry significance, a table giving their sociological status in the plant communities to which they belong, and separate indexes of German and scientific names.

13. FOREST ZOOLOGY

See also *For. Abstr.* 12
(Nos. 400–2, 573, 579, 701–2, 746 *et seq.*)

206. AZIZ, M. A., and SITARAMAN, N. L. **Studies on the *Dinoderus* borer in Bamboo. Part I. A note on copulation in *Dinoderus* sp. Part II. Identification of sexes in *Dinoderus* sp.** *Proceedings of the Indian Academy of Sciences, Bangalore* 28*B* (1), 1948 (99–105). O.R.S.

[Cf. *For. Abstr.* 12 (No. 575).]

207. BARTER, G. W., and BROWN, W. J. **On the identity of *Agrilus anxius* Gory and some allied species (Coleoptera: Buprestidae).** *Canad. Ent.* 81 (10), 1949 (245–9). *Contr. Div. Ent. Dep. Agric. Can.* No. 2633. O.R.S.

Two species of *Agrilus*, one feeding on Birch and the other on Poplar, have been confused as *A. anxius*. The species feeding on Aspen is named by the authors *A. liragus* sp. nov.

208. KARPIŃSKI, J. J. Kózki (Cerambycidae) puszczy Białowieskiej. **[The Cerambycidae of the forest of Białowieża.]** *Rozpr. Spraw. Inst. Bad. Leśn.* No. 55, 1949. pp. 33. [Pol.russ.f.]

A preliminary list.

209. FRASER, M. G. **Notes on the biology of *Saperda scalaris* L. (Col., Cerambycidae).** *Ent. mon. Mag.* 86 (1029), 1950 (33–6).

A brief life history of *S. scalaris*, larvae of which were found in Delamere forest, Cheshire, in Oak debris, and in posts made from cleft billets of Oak and Chestnut.

210. BALACHOWSKY, A. Faune de France. 50. Coléoptères scolytides. **[The fauna of France. 50. Coleoptera—Scolytidae.]** Office Central de Faunistique, Fédération Française des Sociétés de Sciences Naturelles, Paris 1949. pp. 320. 21 pp. of refs. [F.] [L'Institut Pasteur de Paris.] P.R.

The morphology, biology, distribution, parasites, economic importance, collection and classification of the Scolytidae are discussed,

and some 140 species are described. A list of host plants and an extensive bibliography are included.

211. BELYEA, R. M. **Seasonal history notes on *Pityokteines sparsus* Lec.** *Bi-m. Progr. Rep. For. Insect Invest. Dep. Agric. Can.* 6 (1), 1950 (2).

212. MAMET, R. **An annotated catalogue of the Coccoidea of Mauritius.** *Mauritius Inst. Bull.* 3 (1), 1949 (1–81).

Including a list of predators and parasites.

213. BALDWIN, W. F., and COPPEL, H. C. **The biology of *Phorocera hamata* A. & W., a tachinid parasite of sawflies.** *Canad. Ent.* 81 (10), 1949 (237–45). 8 refs. [Dominion Parasite Laboratory, Belleville, Ont.] O.R.S.

214. BURBIDGE, D., and LEJEUNE, R. R. **The effects of moisture on Larch sawfly cocoons.** *Bi-m. Progr. Rep. For. Insect Invest. Dep. Agric. Can.* 6 (1), 1950 (2–3).

The effects of flooding on Larch sawfly [*Pristiphora erichsonii*] were studied under field conditions during 1949. The results obtained indicate the importance of precipitation and water levels in Tamarack swamps in regulating the abundance of the Larch sawfly. Overwintered cocoons withstood prolonged submergence much better than newly spun cocoons collected at midsummer, and of the latter, those less than 2 weeks old were very susceptible to submergence, but resistance increased with age and cocoons 10 weeks old withstood submergence for a month. It is concluded that a wet spring, not too prolonged, when Tamarack swamps are generally flooded, would kill few cocoons; it would simply delay development and subsequent defoliation. Many cocoons would probably be killed in a normal or dry spring followed by heavy rain in mid June, because the greatest number of developing stages are then present. Still greater mortality could be expected from heavy rains during late July and most of August when the newly spun cocoons are in the ground.

215. COATON, W. G. H. **Notes on some South African species of the families Hodotermitidae and Kalotermitidae.** *Repr. from Journal of the Entomological Society of Southern Africa* 12 (Sept.), 1949 (13–77). 28 refs. [Division of Entomology, Pretoria.] P.R.

216. HAWBOLDT, L. S., and CUMING, F. G. **Cankerworms and European winter moth in Nova Scotia.** *Bi-m. Progr. Rep. For. Insect Invest. Dep. Agric. Can.* 6 (1), 1950 (1–2).

Since the early 1930's, outbreaks of 'cankerworms' have been more or less continuous at points along the South Shore of Nova Scotia. It has been assumed that the species concerned were both fall cankerworm (*Alsophila pometaria*) and spring cankerworm (*Paleacrita vernata*) though no positive identifications had been made of the latter. It has now been established that the second species is not *P. vernata* but the European winter moth (*Operophtera brumata*), whose larvae superficially resemble those of *P. vernata*.

217. GREENBANK, D. O. **Spruce budworm moth flight on Green River watershed.** *Bi-m. Progr. Rep. For. Insect Invest Dep. Agric. Can.* 6 (1), 1950 (1).

Evidence from light traps for a large flight of moths entering the study area from infested areas outside.

218. MILLER, C. A. **A key to some lepidopterous larvae associated with the Spruce budworm.** *Bi-m. Progr. Rep. For. Insect Invest. Dep. Agric. Can.* 6 (1), 1950 (1).

2. SILVICULTURE

219. TSCHERMAK, L. Waldbau auf pflanzengeographisch-ökologischer Grundlage. **[Silviculture on the basis of plant geography and ecology.]** Springer-Verlag, Vienna 1950. pp. 722. Numerous refs. [G.] Price: [£5. 6*s*. 8*d*.].

A textbook written expressly for the conditions of central and S.E. Europe—primarily for Austria and the neighbouring countries but also covering the Balkans and Turkey. The work is divided into two parts:—*Part I—Ecological foundations* has chapters on the influence of the principal locality factors on tree species and forests (pp. 7–105); forest types, distribution of forests and tree species (including accounts of the natural range of all important

species of the regions concerned and of the forest regions of Austria, Germany, the Balkans and Turkey), and questions of race and provenance (pp. 105–291); and the silviculturally important phenomena in the life history of trees (pp. 291–327). *Part II—Technique of silviculture* has chapters on forest stands (forms, structure and composition, forest types *sensu* Cajander, the silviculture of individual species and mixtures) (pp. 329–478); regeneration and afforestation (including special chapters on the afforestation of shifting sands, of shallow soils on the sunny slopes of limestone and dolomite formations in warm situations, and of karst lands) (pp. 478–620); tending operations (pp. 621–60); and forms of management (high forest, coppice with standards, coppice; combinations with animal husbandry; combinations with agriculture) (pp. 661–97). There are indexes (*a*) to authors cited, and (*b*) to species, subjects and place names.

220. Beekman, H. A. J. M. Houtteelt in Indonesië. **[Silviculture in Indonesia.]** *Publicatie van de Stichting 'Fonds Landbouw Exportbureau 1916–1918', Wageningen* No. 33, 1949. pp. 386. 372 refs. [Du.]

Contains: (1) A general account of the climatic factors (pp. 13–41), soil factors (pp. 42–104), and forests (pp. 105–129) of the region. (2) A series of comprehensive summaries of the available information on the biology and silviculture of the four important species *Tectona grandis* (pp. 138–245), *Altingia excelsa* (pp. 246–68), *Pinus merkusii* (pp. 269–303), and *Eusideroxylon zwageri* (pp. 304–34). A combined subject and species index is provided.

221. **Silviculture.** *Special Supplement* to *For. Chron.* March, 1950 (50–63).

Summarizes current silvicultural research projects by the Dominion Forest Service and other agencies.

21. SILVICULTURAL CHARACTERS OF TREE SPECIES

See also *For. Abstr.* 12
(Nos. 176, 193, 202, 693).

222. Harlow, W. M., and Harrar, E. S. **Textbook of dendrology covering the important trees of the United States and Canada.** McGraw-Hill Book Co., Inc., New York. 3rd ed., 1950. pp. xiv. + 555. 315 refs. Price $5.00 (£2. 2*s*. 6*d*.).

Cf. *For. Abstr.* 3 (p. 203).

21.0. *Adaptability to the General Environment. Acclimatization*

See also *For. Abstr.* 12
(Nos. 22, 71, 141–4, 198).

223. Weck, [H.] Fremdländische Holzarten bei der Wiederherstellung des Waldes in Deutschland. **[Foreign tree species for the re-establishment of German forests.]** *Merkbl. ZentInst. Forst- u. Holzw.* (*Ser.* 3) No. 9, 1949. pp. 34 + 4 photos. 7 refs. [G.]

Recommends *Pinus contorta* var. *latifolia*, *Larix leptolepis*, *Picea sitchensis*, *Pinus strobus*, *Quercus borealis*, *Prunus serotina*, *Robinia pseudoacacia*, and varieties of *Pinus nigra* for afforestation, and *Pseudotsuga taxifolia*, *Abies grandis*, *Chamaecyparis lawsoniana*, *Thuja plicata*, *Tsuga canadensis* and *T. heterophylla*, and *Castanea sativa* for supplementing permanent stands.

224. Parker, J. **Planting Loblolly Pine outside its natural range.** *J. For.* 48 (4), 1950 (278–9).

A short account of successful acclimatization of *Pinus taeda* in Australia, N. Zealand, S. Africa, S. America, etc.

225. Aughanbaugh, J. E. **Japanese Red Pine.** *Pa. For. Wat.* 2 (1), 1950 (10–11, 18).

Gives data for growth and habit of *Pinus densiflora* in several plantations in Pennsylvania. Its tendency to maintain several leaders in shrub-like clumps, its poor height and diameter growth, and its peculiar susceptibility to windthrow and ice breakage render it quite unsuitable for commercial planting in this region.

226. Kantor, J. Borovice pryskyřičná (*Pinus resinosa* Ait.). **[Red Pine.]** *Lesn. Práce* 28 (8/10), 1949 (369–76). 3 refs. [Cz.russ.e.]

Briefly reviews the botanical characters, wood properties and ecological requirements of *P. resinosa* with special reference to its probable value in Czechoslovakian forestry, particularly as a decorative species for the edge of woods and as a component species in windbreak mixtures for dry sites in S. Moravia. It has been grown on a few occasions in Czechoslovakia, but no proper trials have been made. Nursery

seedlings raised by the Silvicultural Institute of the Brno Agricultural Academy from sowings at the end of June 1947 mostly survived severe drought in that summer. They were lifted, graded, and lined out in April 1948 in very poor, weedy ground. The survivors—varying from 28% of the grade I to 5% of the grade III stock—were showing normal growth in the autumn, and are to be used for further trials.

227. MRÁZ, C. K., and HEJTMÁNEK, C. J. Pajasan žlaznatý [***Ailanthus glandulosa* Desf.**] *Lesn. Práce* 28 (6/7), 1949 (302–11). 22 refs. [Cz.]

A review dealing chiefly with the silvicultural characters of the species and its possible value as a forest and ornamental tree in Czechoslovakia.

228. KOLTAY, G. A nyarfa erdögazdasági jelentösége. [**The significance of Poplars in forestry.**] *Erdész. Lap.* 85 (8), 1949 (172–7). [Hu.russ.f.e.g.]

Plantation practice in Western Europe, particularly Belgium and Holland, is compared with Hungarian conditions, which require closer planting (4 × 4 m.), a longer rotation (40 years) and crop thinnings. The main lines on which Poplar cultivation in Hungary should be developed are suggested.

229. ACOSTA SOLÍS, M. Especies forestales y ornamentales leñosas aconsejadas para las regiones y climas del Ecuador. [**Forest and ornamental woody species recommended for different regions and climates in Ecuador.**] *Publ. Dep. for. Ecuador* No. 7, 1949. pp. 40. [Span.]

Includes lists of species classified according to their suitability for different objects and types of soil in Ecuador, species suitable for cities and roadside plantations in the coastal and mountainous regions, and a botanical index to the species mentioned, with notes on distribution, habitat, silvicultural requirements, etc.

230. ALBANESI, H. Forestales que prosperan en el norte de la Pampa. [**Tree species which prosper in the northern Pampas Territory.**] *Alm. Minist. Agric. Argent.* 24, 1949 (157–9). [Span.] A.P.B.

Recommends likely species for afforestation in this region.

231. LEIRA, A. R. Alcanfor. [**Camphor.**] *Alm. Minist. Agric. Argent.* 24, 1949 (225–8). [Span.] A.P.B.

The camphor tree (*Cinnamomum camphora*) requires a fertile sandy clay or sandy soil with a permeable subsoil, an annual rainfall of between 1,250 and 2,000 mm., and a temperature that never sinks below – 9·5° C. These conditions are found in certain parts of Argentina, where cultivation of the tree might be profitably undertaken. The author suggests that attempts might also be made to raise from seed *Ocimum kilimandscharicum*, a herbaceous plant native to Kenya, which yields camphor on extraction.

232. CARNEVALE, J. A. El castaño. [**Chestnut.**] *Alm. Minist. Agric. Argent.* 24, 1949 (65–71). [Span.] A.P.B.

Brief notes on *Castanea sativa* and its cultivation.

233. YAKOVLEV, M. I. Eshche raz o dube v Sibiri. [**A further note on [Mongolian] Oak in Siberia.**] *Lesn. Khoz.* 1950 (1), (79–80). [Russ.]

Seed of *Quercus mongolica* from the Far East was sown in spring 1933, after winter stratification, at the Isil'kul' railway tree nursery. The beds were sheltered on the E. and W. sides by a shelterbelt and thickets, but were open to the N. and S. Excellent seedlings were obtained, some of which were planted as an avenue, the rest being left in the beds at 50–200 per sq. m. Tending was confined to weeding and loosening the soil. In 1945 about 200 well developed trees 8–10 m. high remained on an area of 30 sq. m. The next year a thinning removed about 50% of the stand (suppressed and poorly growing trees). The avenue trees, planted 1·2–2 m. apart in the rows, were also *ca.* 10 m. high and 14–18 cm. in diameter. Fruiting occurred in 1943 and 1945, but seed was not collected. In 1947, however, all the trees—both in the avenue and in the former beds—fruited and gave a harvest of 30 kg. of acorns. These were stratified and sown in the nursery in spring 1948. Some of this was lost through too shallow sowing by inexperienced workers and through soil blowing, but in autumn 1949 there were 500 plants on an area of 20 sq. m., which were ready for planting out, being 15–40 cm. tall and 4–6 mm. in diameter at root collar. All the trees raised so far have been healthy. The young plants are being used in mixture with *Caragana arborescens* to form a

snow screen, and the good results obtained suggest that this species will be a valuable one for steppe plantations in Siberia.

234. Voinov, V. V. Probkovÿ dub v Krÿmu. **[Cork Oak in Crimea.]** *Lesn. Khoz.* 1950 (1), (58–9). [Russ.]

Tabulates localities and numbers of trees of *Quercus suber* and *Q. occidentalis* [without giving separate figures for each] known to be growing in Crimea; some of these, in the Nikitski Sad, were planted as long ago as 1820 and were recorded as having produced high-quality cork. Gives notes on silvicultural characters, pointing out that these Oaks have withstood temperature of – 14 ° C. without serious damage, and in places with some shelter from wind have survived – 17° C. with little damage. Cork-growing should be perfectly feasible, expecially between Kastropol and Alushta, up to 350 m. above sea level, preferably on wind-shielded north-west, north, and north-east slopes with deep, moist, clay-loam soils. Sowings should be made in early spring, of acorns stratified since autumn, either on clean-cultivated plots or else in trenches 1–1·5 m. wide and 10 m. long. Soil should be worked to at least 30–40 cm. depth. Good results are obtained from careful sowings of pre-germinated acorns. On exposed sites the best means of preventing damage to the seedlings appears to be the mutual protection gained by sowing the acorns densely (10 per running metre).

235. Gutiev, G. T. Morozostoykost' tungovogo dereva. **[The frost resistance of the Tung tree.]** *Dokl. vsesoyuz. Akad. sel.-khoz. Nauk Lenina* 1950 (1), (22–5). 8 refs. [Russ.russ.] A.C.P.

Trials of *Aleurites fordii* and *A. cordata* were started in Abkhazia, W. Georgia, Kakhetia, Azerbaidzhan and the subtropical zone of Krasnodar Province in 1934–36, consisting of 55 plots in all, with 25 1-year-old seedlings of each species per plot. The present paper reports on the behaviour of these in the subsequent 14 years. *A. fordii* proved much more frost-resistant than *A. cordata*: in youth, given good drainage, it was uninjured by temperatures of – 9 to – 10° and even – 11° C., temperatures which caused losses in *A. cordata*. At fruiting age *A. fordii* withstood frost of –12 to –13°, and in some cases –14° if the plantation was on a slope and properly tended. Frosts of –15° left few trees uninjured, but complete killing occurred only at temperatures lower than –20°. *A. fordii* is thus considerably hardier than citrus crops.

236. Saatçioğlu, F. Sinop civarinda Aksaz batakliğinda Okaliptüs yetiştirilmesi incelemeleri. **[Investigations on growing *Eucalyptus* in the Aksaz marsh in the Sinop region.]** *Ankara Yüksek Ziraat Enstitüsü Dergisi* 6 (2) (*Ser. No.* 12), 1946 (379–87). [Turk.]

The possibilities of growing Eucalypts in the Aksaz marsh, close to the Black Sea, were investigated. Native tree growth round the marsh consists chiefly of mixed stands of *Quercus pedunculiflora*, *Q. conferta*, *Q. sessiliflora*, *Fraxinus oxycarpa*, *Alnus barbata*, *A. glutinosa*, and other hardwoods, while the mean annual temperature at Sinop, the nearest meteorological station, averages 17° C., and the minimum – 4·6° to – 6° C. Experience with quick-growing Eucalypts in Turkey, which have succeeded with a mean annual temperature of 15–20° C., as in the coastal regions of S. Anatolia, lead the author to conclude that such species as *E. rostrata*, *amygdalina*, *globulus*, *robusta*, and *viminalis*, could be grown successfully at Aksaz.

237. Adali, F. Verimi gayesile okaliptüs yetiştirilmesi. **[Growing *Eucalyptus* for profit.]** *T.C. Tarim Bakanliği Dergisi* 1 (3), 1947 (20–1). [Turk.] C.G.B.

In recent years increased efforts have been made to cultivate *Eucalyptus* in S. Turkey. In many parts of the country it has proved disappointing. The author describes the conditions essential to success, chiefly a not too low minimum temperature and ample soil water. While there may be species, e.g. *E. alpina*, able to withstand the – 10° C. of a Turkish winter, the most cold-resistant species tried, viz. hybrids of *E. rostrata*, cannot withstand more than – 6° C.; at lower temperatures the stems get frost-cracked and become useless for timber. Growth is unsatisfactory where rainfall is high and on land which is under water in the wet season: abundant and deep underground moisture is necessary, as in marshland. Irrigation, however, would never justify the cost. [Cf. *For. Abstr.* 9 (No. 2194).]

238. Métro, A. L'écologie des *Eucalyptus*: son application au Maroc. **[The ecology**

of the Eucalypts: application in Morocco.] *Mémoires de la Société des Sciences Naturelles du Maroc, Rabat* 49, 1949. pp. 112 + 10 photos, 2 gphs., 2 tbls., 5 maps. 43 refs. [F.]

Contains the following chapters: account of the acclimatization of Eucalypts in Morocco to date (5 pp.); physiography of Australia (16 pp.); ecology etc. of Eucalypt forests (10 pp.); possible rôle of Eucalypts in forest policy (4 pp.); choice of Eucalypt species for different sites, uses etc. (6 pp.); monograph on the principal species of Eucalypt of possible interest for Morocco, giving silvicultural characters and wood properties of 25 species (47 pp.); Australian species of Acacia of possible interest for Morocco (7 pp.).

239. GODDING, R. Un arbre de boisement intéressant pour les régions d'altitude du Congo: l' *Eucalyptus grandis* (Hill) Maiden. [***Eucalyptus grandis*, a species of possible interest for afforestation at high altitudes in the Congo.**] *Bull. agric. Congo belge* 41 (1), 1950 (53–6). [F.]

Further data on the growth of an experimental planting made in 1945. [Cf. *For. Abstr.* 10 (No. 2530).]

240. ACOSTA SOLÍS, M. El eucalipto en el Ecuador. [**Eucalyptus in Ecuador.**] Editorial 'Ecuador', Guayaquil 1457, Quito, Ecuador. (2nd ed.), 1949. pp. 48 + 10 plates. [Span.] [Instituto Ecuatoriano de Ciencias Naturales and Departamento Forestal del Ecuador.]

A booklet summarizing methods of raising *Eucalyptus* in Ecuador (based on experience dating from its introduction in 1865) and including other general information on the species. The contents are presented under the following heads:—(1) general information on *Eucalyptus*; (2) external factors in the Ecuador Sierra (altitude, climate, soil) of importance for the acclimatization of the species; (3) methods of cultivation in the Sierra, including seed collection and storage, germination tests, nursery practice, planting out, tending, diseases, and fellings; (4) uses of *Eucalyptus* and its economic importance in Ecuador; (5) properties of the wood; (6) recommendations for more intensive reforestation with *Eucalyptus* and notes on suitable species. [Cf. *For. Abstr.* 8 (No. 180).]

241. KLOOT, W. G. VAN DER. Resultaten van de proeftuinen voor boomgewassen sedert 1937, loofhoutsoorten I (*Eucalyptus*). [**Results from experimental gardens for trees since 1937. Deciduous trees I** (***Eucalyptus***).] *Rapp. Bosbouwproefsta., Buitenzorg* No. 24, 1950. pp. 19. [Du.jav.e.]

[Cf. *For. Abstr.* 11 (No. 1803).] Results from the 3 experimental gardens cited are best at Sumberwringin (altitude 800 m.) and worst at Tjikampek (60 m.). Most of the species tested were susceptible to attack by white ants, and only non-susceptible species can be considered for further experiments. *E. deglupta*, which is indigenous to the archipelago, generally does well. *E. gummifera* is the only species from tropical Australia which has so far failed completely. Generally, species from climates similar to that of Java succeed fairly well. On the basis of the results, 13 species have been rejected, 6 (*E. microcorys, E. paniculata, E. punctata, E. racemosa, E. robusta, E. triantha*) are still on trial, and 5 (*E. alba, E. grandis, E. saligna* and *E. umbellata* at 800 m. and over, and *E. deglupta* generally) have been recommended for large-scale trials.

242. HELLINGA, G. Resultaten van de proeftuinen voor boomgewassen sedert 1937. Loofhoutsoorten II. [**Results from experimental gardens for trees since 1937. Deciduous trees II.**] *Rapp. Bosbouwproefsta., Buitenzorg* No. 27, 1950. pp. 29. [Du.jav.e.]

Reports are made on about 130 exotic species grown in 5 experimental gardens in Java since 1937. Information is given on the natural distribution of the species, their uses, and provenance of the seed, and figures are given showing the height and diameter at a given age.

Soil Requirements. Nutrient Requirements

See also *For. Abstr.* 12 (Nos. 66–7, 69–71, 73, 96, 119, 143, 678).

21.6. *Growth Form. Habit. Behaviour in the Stand*

See also *For. Abstr.* 12 (Nos. 99–100).

21.8. *Phenology*

See also *For. Abstr.* 12 (Nos. 97, 105–6, 267, 811–2).

243. CHOWDHURY, K. A., and TANDAN, K. N. **Extension and radial growth of**

trees. *Nature, Lond.* 165 (4201), 1950 (732–3). 9 refs.

Investigations carried out at Dehra Dun have established the following facts:—In *Michelia champaca*, an evergreen and diffuse-porous tree, the terminal buds of the previous year show swelling by the middle of February, and shoot extension is apparent in the 3rd week of March. Extension growth continues until the end of May and then stops. Cambial activity (i.e. radial growth) is initiated about the end of June at the terminus of the last year's shoot, and progresses basipetally down the tree, and acropetally towards the tip of the current year's shoot. Extension growth is resumed about the middle of July, and both types of growth continue simultaneously until the end of October or beginning of November. The pattern of growth is much the same in *Melia azedarach*, a deciduous and semi-ring-porous tree, though the dates are all somewhat earlier.

These observations differ considerably from those reported from Europe and North America, where extension and radial growth start simultaneously. The authors conclude that there appear to be two distinct auxins involved in the growth of a tree—one for extension and the other for radial growth—and that they are capable of acting either singly or jointly. [Cf. *For. Abstr.* 2 (p. 301).]

244. GIANNUOLI, S. Ciclo di accrescimento e differenziazione delle gemme in piante perenne nel territorio di Bari. 6. Istologia e ritmo di accrescimento del legno di *Ficus carica* L. **[Growth cycle and bud differentiation in perennial plants in the neighbourhood of Bari. 6. Histology and growth rhythm of wood of *F. carica*.]** *Nuovo G. bot. ital* (*n.s.*) 56 (1/2), 1949 (188–97). 5 refs. [It.it.e.] A.P.B.

Cf. *For. Abstr.* 11 (No. 200).

22. SILVICULTURAL SYSTEMS. FORMS OF STAND

See also *For. Abstr.* 12 (Nos. 49, 68, 99, 154–6, 257, 259–60, 303, 307–8, 320, 817–9, 846).

245. METZ-NOBLAT, H. DE. La reconstitution d'une forêt. **[The re-making of a forest.]** *Rev. for. franç.* No. 4, 1950 (207–22). [F.]

Describes the conversion of an area of devastated and neglected coppice-with-standards to high forest managed on a group-selection system.

246. GRACE, L. A. DE. **Selective logging of Spruce in sub-alpine Alberta.** *Silv. Res. Note For. Br. Can.* No. 96, 1950. pp. 15.

Spruce (*Picea glauca* and *P. engelmanni*) supplies the main timber cut of the Alberta east-slope region. Clear cutting tends to destroy advance growth, and the regeneration period, even with seed source available, is at least 30 years. Selective logging preserves most of the advance growth, as well as leaving a residual stand capable of increased growth. Comparison of a young even-aged stand with two selectively logged stands, suggests that the potential value of a residual stand can exceed that of a well developed 50-year-old, even-aged stand. *From author's summary.*

247. GRACE, L. A. DE. **Management of Spruce on the east slope of the Canadian Rockies.** *Silv. Res. Note For. Br. Can.* No. 97, 1950. pp. 55. 18 refs.

Report on an examination of cut-over Spruce [*Picea glauca* and *P. engelmanni*] stands in the east-slope area of Alberta, representing all degrees of cutting. Results indicate that volume/acre should not be reduced below 3,000 bd. ft. in any Spruce forest if further cuts within 40 years are desirable. Mortality in the residual stand averages 13·5%. Reproduction will provide an adequate supply of stand recruits wherever the residual stand exceeds 1,000 bd. ft./acre. Vigour of residual trees is largely a matter of spacing. A numerical assessment of stems competing with any tree, designated the competition factor, is suggested for distinguishing potentially vigorous from potentially non-vigorous trees. *From author's summary.*

248. KELLY, J. A. B., and PLACE, I. C. M. **Windfirmness of residual Spruce and Fir.** *Silv. Leafl. For. Br. Can.* No. 39, 1950. pp. 2. 1 ref.

In 1934 about 2½ cords/acre were taken in thinnings from a Spruce and Fir stand 60–70 years old, and in 1946, a further 14½ cords/acre were removed, leaving an open stand of *ca.* 4 cords/acre or less than 30% of the original merchantable volume. Though exposed to high winds and rooted in a shallow soil, it was

found in 1949 that only about 5% of the residual stand had been killed by uprooting and wind breakage. Of the 17 trees affected, 12 were Fir, all of which were broken because of butt rot. The five Spruce were all windthrown. The trees forming the residual stand were chosen for their crown length, crown density, and stout anchorage roots, and it is concluded that, although cuts as heavy as the one in this study are not recommended, the data indicate that on some sites, careful marking of pulpwood stands for a partial cut can reduce subsequent loss from windfall to quite reasonable proportions.

23. FORMATION OF STANDS

See also *For. Abstr.* 12 (No. 815).

23.1. *Natural Regeneration*

See also *For. Abstr.* 12 (Nos. 65, 264, 305, 307).

249. McKenzie, A. R. **Reproduction of pulpwood stands.** *Pulp Paper Mag. Can.* 51 (3), 1950 (245–6, 248, 250, 252, 254, 256, 258). [Abitibi Power and Paper Co. Ltd.] *Woodl. Sect. Index Canad. Pulp Pap. Ass.* No. 1043 (*F*–2).

Includes a description of conditions in the Cochrane District [Ontario], a discussion of some general points and an outline of future plans for regeneration studies.

250. Place, I. C. M. **Origin of reproduction on Black Spruce swamps.** *Silv. Leafl. For. Br. Can.* No. 38, 1950. pp. 2.

It has long been disputed whether the reproduction on Black Spruce [*Picea mariana*] swamps is mainly from seed or from layering. In June 1949 a brief study of this problem was made at the Acadia Forest Experiment Station. It was found that reproduction per quadrat in the open averaged 6·5 seedlings (4·3 over 1-year-old and 2·2 1-year-old) and 6·3 layers. Under canopy the corresponding numbers were 2·9 (0·7 and 2·2) and 1·5.

251. Atkins, E. S., and Farrar, J. L. **Slash disposal in relation to Jack Pine reproduction.** *Silv. Leafl. For. Br. Can.* No. 45, 1950. pp. 2. 2 refs.

Re-examination of sample plots established in 1944, showed that neither topography nor slash disposal (burning, lopping, leaving undisturbed) had much effect on Jack Pine reproduction. [Cf. *For. Abstr.* 8 (No. 207).]

252. Meagher, G. **Reproduction of Ponderosa Pine.** *J. For.* 48 (3), 1950 (188–91). 17 refs.

Reviews the literature on the subject and concludes that frequent, light cuttings, judicious use of cattle grazing to reduce competition from grass, exclusion of fire and all possible protection from rodents, are the requisite conditions for satisfactory natural regeneration in pure stands of this species.

253. Squillace, A. E., and Adams, L. **Dispersal and survival of seed in a partially-cut Ponderosa Pine stand.** *Res. Note Nth. Rocky Mt. For. Range Exp. Sta.* No. 79, 1950. pp. 4.

Ponderosa Pine (12·5/acre) on the sample areas scattered their seed from the unusually heavy 1948 crop at the rate of 104,000/ acre. Cutting tests indicated that 72·7%, or almost 76,000/acre were sound. The fall reached a peak in September and was almost complete by the end of October. Soundness varied with time of dispersal; 78% of that which fell in September was sound, compared with 50% at other times. Of the sound seed disseminated, 92% was destroyed by rodents and other agents before May 1949, leaving only 5,800 sound seed per acre available for germination. [Cf. *For. Abstr.* 12 (No. 744).]

254. Roe, A. L., and Squillace, A. E. **Can we induce prompt regeneration in selectively-cut Ponderosa Pine stands?** *Res. Note Nth. Rocky Mt. For. Range Exp. Sta.* No. 81, 1950. pp. 6.

Mineral soil, exposed by scarification, had roughly 8 times as many seedlings per acre as occurred on the natural duff under otherwise similar conditions. Burning appears to be nearly as effective as exposing the mineral soil by mechanical means.

255. Ralston, R. A. **Red Pine seedling survival under different levels of stocking.** *Tech. Notes Lake St. For. Exp. Sta.* No. 334, 1950. p. [1].

A study of *Pinus resinosa* seedling survival in stands of 50, 80, 120 and 160 sq. ft. basal area/acre showed that best survival occurred under the lightest overstorey. Although

thousands of seedlings germinated, relatively few survived under the heaviest stocking after 5 growing seasons.

256. TANIGUCHI, S. **Preliminary observations on the characteristics of self-regenerated stands in northern Hokkaido.** *Res. Bull. exp. For. Hokkaido Univ.* 14 (1), 1948 (78–100). 10 refs. [Jap.]

A first report of a statistical study of natural stands of Todomatsu [*Abies sachalinensis*] and Ezomatsu [*Picea jezoensis*].

257. JONES, E. W. **Some aspects of natural regeneration in the Benin rain forest.** *Emp. For. Rev.* 29 (2), 1950 (108–24 + 6 photos). 4 refs.

The Cambridge Botanical Expedition to Nigeria examined the working of the 'tropical shelterwood system' [cf. *For. Abstr.* 9 (No. 826)] in the Okomu Forest Reserve, Benin. The forest here is perhaps an overmature stand, at present breaking up through the action of storms, old age, and light, scattered exploitation. In undisturbed forest, the majority of the economically valuable emergents do not appear to be regenerating continuously, judging from the proportions of various size-classes; there are numerous saplings of some of the *Meliaceae* in and around gaps. At least 40–50 saplings of 'economics' per acre exist as advance growth when operations for regeneration begin, 5 years before exploitation; but a far greater number enter after the first climber cutting, and either shortly before or after the first opening of the canopy by girdling and poisoning. In later stages of regeneration operations (i.e. second climber cutting and further opening of canopy), it is mainly worthless, short-lived species characteristic of secondary forest that enter.

Commercial exploitation is not likely to be followed by satisfactory regeneration without assistance but, provided that exploitation remains light, a system in which silvicultural treatment follows it, instead of preceding it as at present, would be satisfactory. The possibility of regenerating after farming, with seed from emergents left standing over the crops, deserves study. Climber-tangle is of several kinds; beneath it there is sometimes valuable regeneration which needs assistance if the tangle is to revert reasonably quickly to high forest. Tangle of this kind will repay treatment better than high forest containing no reproduction of valuable species.

Finally it is concluded that to maintain natural mixtures of species and forms of forest is a measure of prudence. Until much more is known about the ways in which species interact with each other and with the soil, it is impossible to predict whether departure from natural forms will be followed by disaster or not.

258. TRYON, H. H., and FINN, R. F. **On obtaining natural hardwood regeneration.** *Black Rock For. Pap.* 1 (22), 1947 (136–9). 5 refs.

Cf. *For. Abstr.* 8 (No. 1067).

259. ZILLGITT, W. M. **Quality of reproduction following partial cutting of northern hardwoods.** *J. For.* 48 (5), 1950 (324–5).

Examination of sample plots of northern hardwoods in Michigan, 20 years after they had been subjected to different degrees of cutting (clear cutting, removal of 90, 62, 46, and 24% of trees respectively, no cutting and a group selection cutting) showed that moderate selection cuttings produce as many good trees per acre as clear cutting and that all degrees of partial cutting produce a higher proportion of good trees.

260. LONČAR, I. O pravilnoj obnovi sastojina lužnjaka i graba. [**The regeneration of common Oak and Hornbeam stands.**] *Šum. List* 73 (6/7), 1949 (201–5). [Croat.russ.e.]

Simple felling prescriptions are given to maintain a satisfactory admixture of Oak [*Q. pedunculata*] in Hornbeam [*Carpinus betulus*].

261. BEARD, J. **Growing Wattle.** *J. S. Afr. For. Ass.* No. 19, 1950 (89–91).

Discusses and disagrees with, an article by J. H. Holley [cf. *For. Abstr.* 11 (No. 1762)]. Beard claims that experiments have shown that there is no significant difference in yield between burnt and unburnt sites, and that regeneration is easier on the latter.

23.2. *Artificial Regeneration*

262. DALE, I. R. **Regeneration and afforestation in Uganda.** *Wood* 15 (4), 1950 (122–3).

Cf. *For. Abstr.* 11 (No. 1753).

263. BECKING, J. H. Der Anbau von *Pinus merkusii* in den Tropen. [**Silviculture of *Pinus merkusii* in the tropics.**] *Schweiz. Z. Forstw.* 101 (5), 1950 (181–91 + 4 photos). [G.f.]

Describes the methods of forming plantations of *P. merkusii* in Java and Sumatra. Seed is extracted, dried in the sun, and sown in ant-proof boxes. Seedlings are transplanted at 6–8 weeks, and the transplant beds inoculated, if necessary, with mycorrhiza-forming fungi. When *ca.* 10 cm. high, the transplants are ball-planted during wet weather in lightly dug ground at 3 × 3 m. spacing. After 7 years the canopy closes and the plantation is severely thinned, and pruned to a height of 2 m. By successive thinnings every 3 and later every 5 years the spacing between the trees is increased to first 22% and then 25% of the mean height of the 100 highest trees on each hectare. The rotation for pulpwood is 20 years, for sawlogs and resin tapping 60 years. At 30 years m.a.i. should be *ca.* 25 cu.m./ha.

23.22. Preparatory Work. Auxiliary Measures

264. **[Effects of preliminary disking on natural and artificial regeneration in the Lake States.]** *Rep. Lake St. For. Exp. Sta. 1949*, 1950 (6–9).

A test of various degrees of disking in comparison with ploughing, was made on 3 different types of brushy and difficult planting sites. All ground preparation was done in August, and the areas were planted with Red Pine in the following spring. After 4–5 growing seasons, the moderately disked areas showed significantly better results than the ploughed ones. Heavy disking, or re-disking in the second season are of doubtful value. Disking also gave good results when applied immediately before direct sowing with Balsam Fir.

In May 1948, a scattered stand of second-growth hardwoods in northern Wisconsin was double-disked with an Athens-type disk at a cost of *ca.* $6.00/acre, exposing some 60% of the mineral soil. The ground cover was 10% Hazel brush and 90% grass. In the first season after disking, a heavy crop of nettles covered the area; by the autumn of 1948, the area had 40% stocked quadrats with 1,120 new seedlings per acre; and by autumn 1949 there were some 18,500 seedlings per acre. The % composition of the seedling stand was Sugar Maple 94·5, Aspen 2·6, Black Cherry 1·2, Yellow Birch 1·0, Red Maple 0·6 and American Elm 0·1.

265. SKLYARENKO, T. F. Vliyanie agrotekhnicheskikh meropriyati na dinamiku rosta bereskleta borodavchatogo i drugikh drevesnykh porod. [**Influence of agricultural measures on the growth of *Euonymus verrucosa* and other woody species.**] *Lesn. Khoz.* 1950 (1), (50–3). [Russ.]

The experiments described were undertaken with the aim of shortening the period between planting *E. verrucosa* and harvesting its roots for gutta-percha, a period lasting 15–20 years when this crop is grown in natural conditions under forest canopy. In 1944, in the Mogilev-Podol'sk forest, trials were started in which *E. verrucosa* was planted in 'drainage trenches'. The trenches were made 0·5–1 m. wide and 35 cm. deep, their bottom was lined with a 5–7 cm. layer of brushwood and grass for drainage, covered with 10–12 cm. of earth and humus (5 kg. per linear metre), which in turn was covered with 10–15 cm. of earth. This method is said to conserve soil moisture and to encourage the roots to spread extensively in the humus layer and so increase the yield of gutta. Wildings and nursery-grown seedlings planted in these trenches have shown excellent survival and growth as compared with controls, and have developed better root systems with much thicker roots. It is thought that the interval between planting and harvesting can be reduced by this method to 3–4 years.

The results of these trials suggested that the method might be applicable to the establishment of trees, and small-scale trials with *Quercus robur*, 'Red Oak' [*Q. borealis*?], *Sorbus aucuparia Sophora* sp., and *Staphylea* sp. have shown excellent growth in height and diameter. It is thought that the trench method might be suitable for increasing the survival of shelterbelt plantations and improving their very poor growth in the first 5 years after planting.

23.23. Seed and Sowings

23.23.1. *Seed Procurement, Treatment, and Testing*

See also *For. Abstr.* 12 (Nos. 293, 634).

266. **Seed collection.** *Special Supplement* to *For. Chron.* March, 1950 (35–47).

Data from all provinces of Canada, for:—species collected and amounts needed; periodicity of seed crops; extraction of seed from cones; cleaning of seed; preparation of hardwood seed; storage; and longevity of seed of different species.

267. TROUSDELL, K. B. **A method of forecasting annual variations in seed crop for Loblolly Pine.** *J. For.* 48 (5), 1950 (345–8). 4 refs.

A study was started in May 1948 on the Bigwoods Experimental Forest, to test the accuracy of a method for predicting the size of the seed crop 6 and 18 months in advance of its maturity. The method consists in counting the cones for last year's, this year's and next year's crop on sample branches obtained from felled trees. The count was made in May, when the mature cones are still on the tree, next year's cones are about 1 in. long and have suffered most of the reduction in their numbers, and newly pollinated conelets are beginning their first growing season. The results showed that a sufficiently accurate forecast of crop failures and bumper crops for a forest stand can be made 6 months in advance, by this method. A correlation for % of sound seed, depending on the size of the crop, will improve the usefulness of the estimate. There was abundant evidence that forecasts must be made separately for partially cut and uncut stands, since release stimulates seed production [cf. *For. Abstr.* 11 (No. 994)]. The forecast made 18 months before seedfall appears to span a period during which losses may be so heavy that accurate prediction is impossible.

268. GREAUD, R. Novo processo de extracção do penisco. **[New method of extracting Pine seed.]** *Pinhal e Resina* 2 (8), 1949 (82). [Port.]

Describes a new seed-extraction machine, designed in Bordeaux and now used by the French forest service. The cones are subjected to heat treatment from infra-red lamps in a specially designed tunnel, and, in addition, are given about 3 hours' hot-air treatment in special hoppers. Opening of cones under the lamps takes place in 3 minutes. Output from the machine is *ca.* 300 kg. seed/day. [Cf. *For. Abstr.* 10 (No. 200); 8 (No. 2386).]

269. PARKER, J. **Germination of Eastern Redcedar seeds.** *J. For.* 48 (4), 1950 (255–6). 7 refs.

When seeds of *Juniperus virginiana* are freed of their fruit coats and planted out of doors in a forest soil in midwinter, some germination may be expected. Even if fruit coats are not removed, a few seeds may germinate the first spring and a larger number the second spring. Exposure of seed to a temperature of 41° F. or below for 2–3 months appears to be essential for successful germination, though a few seeds may germinate when exposed to room temperature. Scarification of seeds by abrasion, or opening the seeds by cracking the seed coats, resulted in earlier germination, but did not, in the experiments reported, increase total germination. *From author's summary.*

270. VINCENT, G. Rozbory nestejně uskladněných šišek a semen lesních dřevin. **[Investigations of differently stored cones and seeds of forest trees.]** *Zpr. výzkum. Úst. lesn. ČSR* No. 2, 1948 (196–223). 7 refs. [Cz.russ.e.] [Ústav pěstění lesů a lesnické biologie, Brno.]

Reports on two series of investigations: (1) *The ageing of stored seed and the changes accompanying this process*: This work extends and confirms previous work by the author [*Sborn. české Akad. zeměd.* 1929] and Göksin [see *For. Abstr.* 4 (102)]. The changes occurring during ageing, which may be used to distinguish old from fresh seed of conifers, are decreases in the germinative energy and the rate of swelling when absorbing water, and an increase in the acid number of the fats extracted from the seed. The species dealt with are Norway Spruce, Scots Pine, Larch, Silver Fir and Douglas Fir. (2) *Methods of seed storage*: Results indicate that in choosing a method of storage it is useful to distinguish two groups of species, having moisture contents of respectively (*a*) less than and (*b*) more than 20% H_2O in the ripe seed. The moisture %s of ripe seed of the chief species in Czechoslovakia are:—Norway Spruce 6–7, Scots Pine 7–8, Larch 7–9, Douglas Fir 8–10, Alder 8–9, Birch 13–14, Hornbeam and Ash 14–15, Lime 16–17, Robinia 18–19, Beech 20–25, Silver Fir 20–35, Maples 25–30, and Oak 35–45. For group (*a*), represented in the tests by Spruce and Larch, storage in a cellar was quite unsuitable. On the other hand, seed of these stored in the cones in an airy loft for respectively 5 and 3 years had germinative capacities of *ca.* 72 and 60%, but after these periods there

was a rapid decline. Storage in sealed bottles was inferior to this method and is not recommended. Seeds with a moisture content less than 20% tend to remain a long time on the tree, and an airy, cool, dry loft or shed represents an approach to the natural 'storage' of seeds on the tree. Designs for seed storage sheds are discussed with special reference to those of Freudl [*Lesn. Práce* 1929] and Bates [*Tech. Bull. U.S. Dep. Agric.* No. 191, 1930]. Results for group (*b*), in which experiments were made with Silver Fir, Beech and Oak, are of a preliminary nature only. It is clear that their seed should be stored moist and cool, but pending further information only conventional methods (cellar storage, stratification in pits between layers of sand, or dry leaves if the soil is heavy) are recommended.

271. Luk'yanov, B. O khranenii zheludey. **[The storage of acorns.]** *Lesn. Khoz.* 1950 (1), (71). [Russ.]

Diseased and healthy acorns were separated by flotation in water, and the sound acorns dried off and stored in moist coarse sand (15–18 l. water to 100 kg. sand, using two parts by weight of [dry?] sand to one of acorns), on trays in basement-type storehouses from November to April in 1946/47 and 1947/48. Periodical moistening is necessary with this method and overheating must be prevented by mixing the sand and acorns from time to time, but owing to this, the condition of the acorns is under constant inspection. Test results were excellent, viability being 82–90%. The acorns began to germinate at the end of February to March; this process can be controlled at will by adjusting the temperature, e.g. by admitting cold air, or even by putting snow on top of the sand/seed mixture.

272. Heit, C. E. **Physiology of germination.** *Rep. N.Y. St. agric. Exp. Sta. 1949*, 1950 (42–5).

Of 7 species of *Picea* studied, 5 (*P. engelmanni*, *P. glauca*, *P. glauca* var. *albertiana*, *P. rubra* and *P. sitchensis*) did not germinate promptly and completely at temperatures of 20° C. or below. *P. abies* and *P. pungens* var. *glauca* germinated satisfactorily at alternating temperatures of 20° and 30° both in the light and in the dark, and at constant temperatures of 25°, 20° and 15°, though their response was retarded at 15°. The smaller-seeded *Picea* spp. were found to be sensitive to moisture during germination, especially some stocks of *P. engelmanni*, *P. pungens* var. *glauca* and *P. sitchensis*.

23.23.3. *Methods of Sowing*

See also *For. Abstr.* 12 (No. 744).

273. Garman, E. H., and Orr-Ewing, A. L. **Direct-seeding experiments in the Southern coastal region of British Columbia 1923–49.** *Tech. Publ. B.C. For. Serv.* No. 81, 1949. pp. 45 + 1 map. 21 refs.

This bulletin summarizes the present status of experiments that have been conducted from time to time over a period of 26 years. Further studies are in progress or will be initiated in the near future in an attempt to find a practical solution to the problem of direct sowing of large-seeded species such as Douglas Fir. The results so far obtained have shown that the deer-mouse (*Peromyscus maniculatus*) is undoubtedly the greatest single obstacle to the success of direct sowing. This mouse is present in large numbers on logged-over land and will quickly reoccupy an area after it has been burned over. Satisfactory direct sowing of Douglas Fir is impossible until some cheap and practical method of controlling the mouse has been devised. Various control measures have been investigated, and these can be classified as physical barriers, poisons, and repellents. The most promising type of physical barrier, i.e. the screening of seed spots, has so far been found to be too expensive, and the use of broadcast poisons has certain disadvantages. Greater stress, therefore, has been laid upon the repellent method of control, but no completely effective repellent has yet been found and there are still mechanical problems to be solved in the pelleting of seed. This seems, however, to be the most promising line of advance.

Hemlock [*Tsuga heterophylla*] and Cedar [*Chamaecyparis lawsoniana* and *Thuja plicata*] have been sown on carefully chosen sites with fair success, as rodent-control measures were apparently not so necessary for these species. Preliminary studies of the direct sowing of Sitka Spruce with no rodent-control measures have given satisfactory results in small-scale trials.

274. Thomson, C. C. **Direct seeding with Red Pine in central New Brunswick.**

Silv. Leafl. For. Serv. Can. No. 35, 1949. pp. 2.

In an experiment in direct sowing of *Pinus resinosa*, two methods of preparing the seed spots were used:—(1) exposing a patch of mineral soil, sowing the seeds and covering them lightly; (2) loosening enough mineral soil at each seed spot to form a small mound about 3 in. high, sowing the seeds on the mound and covering them lightly. Out of a possible total of 1,742 seed spots, the numbers of successful spots at 1, 2, and 6 years were respectively 1,230, 915 and 785 for the ordinary method, and 465, 370 and 53 for the mounded method.

275. FRITZ, E. **Spot-wise direct seeding for Redwood.** *J. For.* 48 (5), 1950 (334–8).

Reports the results of experiments in direct sowing of *Sequoia sempervirens* in California from 1934 to 1949. Results varied considerably. The principal causes of failure in the germination stage were: sowing too late; drought; washing out or burying of seed by heavy rains; rodents. Principal causes of mortality of seedlings were: unfavourable summer weather; compacted exposed soil following slash fires; rodents. On the whole, however, direct spot sowing shows promise of greater success and less cost than planting. More care is necessary in the preparation of the spots, which should be spaced 6×6 ft. or closer, to obtain the desired distribution after normal mortality. Early sowing (January and February) is preferable to spring sowing. More experiments are needed to determine the desirability of autumn sowing, of mulching the seed spots, and of loosening the soil before sowing. Some mixture of hardwoods, e.g. *Robinia pseudoacacia* and *Liriodendron tulipifera*, is desirable.

23.24. Formation of Stands by Planting

276. TORRICELLI D., E., and MUÑOZ V., D. Técnica defectuosa como causa de pérdidas en las plantaciones de pino insigne. [**Faulty technique as the cause of losses in *Pinus radiata* plantations.**] Dirección General de Tierras y Colonización, Departamento de Bosques, Santiago de Chile. 1950. pp. 15 + 8 plates. 6 refs. [Span.]

An investigation was made by request of the Chilean administration, of the causes of losses in *Pinus radiata* stands, and, as a result, practical recommendations are published concerning times of planting in the different climatic zones of the country, planting methods, preparation of the soil and the selection of plants.

277. WALLIHAN, E. F. **Plantations of northern hardwoods: some factors influencing their success.** *Bull. Cornell agric. Exp. Sta.* No. 853, 1949. pp. 31. 14 refs.

Twenty-six plantations of hardwoods, established in the period 1935 to 1940 in widely separated regions of New York State, were studied intensively to determine what factors control their success. It was concluded that four main problems exist and tentative solutions were offered on the basis of available information:—*Selection of sites that will provide adequate moisture.* A tentative moisture-index scale was set up on the basis of available information on soil and climatic factors. This index apparently explained much of the variability among plantations, which suggests that a more detailed study would make possible a more accurate moisture index to be used as a guide in selecting planting sites. *Maintenance of fertility level.* After variability due to moisture was accounted for, it became apparent that growth of White Ash was strongly correlated with the nitrogen content of its foliage. A marked response to nitrogenous fertilizers could be expected in all areas studied. *Control of frost damage.* The extent of frost damage was closely correlated with lateness of spring frosts. Comparison of a prospective planting site with the seed source, with respect to the average date of the last killing frost in the spring, appears to be useful in selection of planting sites. *Control of damage by mice and rabbits.* Use of Red Oak stock in a region with high rabbit population is not advisable. Likewise, Basswood and Black Cherry should not be planted where the mouse population is high. *Author's summary.*

23.24.1. *Planting Material*

278. SAVCHENKO, A. I. Prizhivaemost' i razvitie kulturȳ sosnȳ obȳknovennoy v zavisimosti ot sortnosti seyantsev. [**Survival and development of Scots Pine plantations in relation to seedling grade.**] *Lesn. Khoz.* 1950 (1), (48–9). [Russ.]

One- and two-year-old seedlings of *Pinus sylvestris*, sorted into 3 grades (using height, diameter, amount of foliage and root development as criteria), were planted out, 2,600–2,700 of each grade, in the Korenevsk forest, White Russia, in 1939.

The present paper reports on the results of inspections in 1940 and 1949, which showed that grade I had remained consistently superior to grade II, and the latter to grade III seedlings, in survival, crown development and closure, and both height and diameter growth. Details are given in tables and a graph.

279. ANDRADE, D. X. DE. Plantio de 'toco' em sucupira (*Bowdichia virgilioides* H.B.K.). **[Stump planting of *B. virgilioides*.]** *Brasil madeireiro* 5 (58), 1949 (32–3). 2 refs. [Port.] [Escola de Agronomia do Nordeste.]

Good results were obtained by root- and shoot-pruning *B. virgilioides* before transplanting. The tap root, when pruned by a third of its length, developed 3 or 4 strong secondary roots. The shoot was best pruned to a height of *ca.* 2–2·5 cm.

23.24.2. *Methods of Planting*

See also *For. Abstr.* 12 (Nos. 299, 321).

280. BENNETT, W. D. **Tree planting machines.** *Woodl. Sect. Index Canad. Pulp Pap. Ass.* No. 1064 (*F*–2), 1950. pp. 4.

Notes on machines used by the Ontario Government:—the Lowther, Michigan, Indiana, Champion, TreeP, Whitfield, and Illinois planters. [Cf. *For. Abstr.* 11 (No. 1010).]

281. BENNETT, W. D. **The Lowther tree planter.** *Woodl. Sect. Index Canad. Pulp Pap. Ass.* No. 908 (*F*–2), 1947. pp. 2.

Cf. *For. Abstr.* 9 (No. 1551).

282. **Mando reforesting hits a new high.** *Woodl. Sect. Index Canad. Pulp Pap. Ass.* No. 986 (*F*–2), 1948. pp. 2 + 4 photos.

Description of the Lowther tree planter. [Cf. preceding abstract.]

23.24.3. *Spacing. Geometric Arrangement*

283. LEMMIEN, W. **A spacing study of Red Pine in Michigan.** *Quart. Bull. Mich. agric. Exp. Sta.* 32 (3), 1950 (360–3).

A spacing of 8 × 8 ft. was more satisfactory than 6 × 6 ft., being easier to tend and producing good pulpwood at the first thinning. Spacing of 10 × 10 ft. will probably produce less merchantable wood than 8 × 8. Artificial pruning is necessary at all spacings.

23.26. Plant Rearing. Nursery Practice

See also *For. Abstr.* 12 (Nos. 107–8, 120, 124, 293, 634, 707, 709, 713).

284. ÉBEL, M. La pépinière. **[The nursery.]** La Maison Rustique, 26 rue Jacob, Paris. 3rd ed., 1947. pp. 335. [F.] Price *Fr.*225 (7*s.* 9*d.*).

This handbook, written primarily for students and amateurs, deals with the practical aspects of running a nursery and includes sections on the following subjects: seed, soil and its preparation, layering, propagation from cuttings, grafting, management of forest and fruit-tree nurseries (with notes on some individual species), planting, transplanting, and, finally, the lifting, packing and transport of young trees.

285. **Green Timbers forestry station and forest tree nursery: a brief review of its purpose and development.** *Publ. B.C. For. Serv.* No. *B.*34 (2nd, revised, ed.) 1950. pp. 20.

286. CARNEVALE, J. A. Cultivos forestales. **[Tree growing.]** *Alm. Minist. Agric. Argent.* 24, 1949 (377–82). [Span.] A.P.B.

Brief practical instructions for establishing a forest nursery and rearing plants from seed, with a list giving the sowing depths for 84 tree species.

287. Plantemas árboles. Como se hace un vivero. **[Let us plant trees. How a nursery is made.]** *Mundo maderero* 10 (120), 1950 (13–5). [Span.]

Instructions in nursery practice with notes on trees suitable for Argentina. [Cf. *For. Abstr.* 12 (No. 230).]

288. LEMAN, V. M. Uskorennoe vȳrashchivanie seyantsev drevesnȳkh pri pomoshchi elektricheskogo sveta. **[Forcing of woody seedlings with the aid of electric light.]** *Lesn. Khoz.* 1950 (1), (60–3). [Russ.]

[For a previous report see *For. Abstr.* 10 (No. 1796).] In 1945–46 Oak seedlings artificially illuminated at night for 6 months had formed up to 6 rosettes and had a height of 70 cm. by the end of the treatment. Work in 1947 and 1948 confirmed the previous results. The 1949 seedlings made 5 rosettes and a total height of 72 cm. in 4 months of treatment. The seedlings [of each year's trials?] were hardened off and put out in open ground in spring. For the first year their growth was poor, though survival was good. They withstood frosts of down to – 30° C. well, despite poor snow cover, and flushed at the normal time in spring, developing leaves normal in shape and size: 60 seedlings planted out in 1945 after 6 months' light treatment had in spring 1949 a height of 160 cm., a root-collar diameter up to 25 mm. and in size were equal to 6- to 8-year-old stock grown in the open on podzols in the Moscow region. Plants given light treatment for 10 months and then grown in the open for 4 years attained a height of 230–260 cm. and a root-collar diameter of 20–45 mm. and equalled ordinary 10- to 12-year-old plants.

Continuously illuminated seedlings of Scots Pine, Larch and Birch, sown in May, had respectively the following heights by August (figures for controls in brackets): 7 (4·5), 12 (5·3) and 44 (21) cm. Even greater differences were recorded for Larch, Birch, Common Ash, and Scots Pine, raised and light-treated in winter. Besides the increases in height, the treated plants showed stronger branching and a great number of leaves, and Scots Pine and Larch showed longer and thicker needles.

It is envisaged that in practice seedlings would be given natural light in the day-time and artificial light at night. Experience suggests that the night lighting can be relatively weak, e.g. one 100- or even 60-watt lamp (300–600 luxes) per sq. m. At least in places favourably situated as regards electricity supplies, the costs of such treatment should not be prohibitive.

289. KESLER, W. Note sur la multiplication du parasolier. [**Note on the propagation of *Musanga smithii*.**] *Bull. agric. Congo belge* 41 (1), 1950 (37–52). 6 refs. [F.f.]

Experiments in the propagation of *M. smithii* made at the Botanical Division of I.N.E.A.C. showed that only sowing gives good results. The seed should be mixed with powdered charcoal, which absorbs the pulp adhering to the seed and gives a greatly increased germination %. In the best conditions (seed mixed with charcoal for 2 days before sowing in well drained soil) germination may amount to 80%. Planting out in baskets gives 95% successful establishment.

290. ENGSTROM, A. **Mulching seedbeds with cellophane.** *J. For.* 48 (4), 1950 (283).

In 1949, transparent, moisture-proof cellophane was used experimentally at the Oklahoma State Nursery as a substitute for hay, straw or burlap, to cover seedbeds in order to hold moisture in the germinating medium. The experiments were so successful that greater use is to be made of this material in 1950. The cellophane needs a supplementary covering material to hold it in place; if burlap is used it can be rolled up for re-use. At present an experiment is being made with cotton burrs to cover the cellophane, and these will later be worked into the soil as an organic supplement. Watering of the seedbeds was unnecessary, the beds being kept moist by condensation on the cellophane covering. It was found that autumn-sown Cedar germinated 3 weeks earlier and spring-sown Ponderosa Pine 5 days earlier, under cellophane than under burlap alone, germination % was greater, distribution more uniform and seedlings 1–2 in. taller at digging time.

291. WELLS, J. S. **Use of sawdust for Ericaceous crops.** *Amer. Nurserym.* 91 (10), 1950 (7–8, 33).

The writer, a member of a firm of nurserymen specializing in Rhododendrons and Azaleas, describes successful experiments in the use of sawdust (species not indicated) (*a*) mixed in the soil of nursery beds, and (*b*) as a mulch. For purpose (*a*) it is necessary to give several light applications of N in organic form, since the bacterial activity necessary to break down the sawdust causes a serious N deficiency. Experiments are now being made in the application of the sawdust some 9 months before the beds are to be used. A 2-in. mulch of sawdust round young Azalea and Rhododendron plants induced fibrous root growth, kept plants in good condition during dry weather and cut down weeding costs by 75–95%.

292. WINTERS, H. F. **Seedbed treatments.** *Rep. Fed. Exp. Sta. Puerto Rico* 1949 (7–8).

An experiment was conducted to compare the effects of media and chloropicrin fumigation in controlling damping-off. Plants grown in pure sphagnum moss suffered from nutrient deficiencies (average height 3·67 cm.). Plants in plots of untreated soil plus 1 in. of sphagnum, grew uniformly well, but not as vigorously as those in plots of treated soil plus 1 in. of sphagnum (average height 7·83 cm.). Plants in treated soil alone, were of intermediate size and vigour (4·03 cm.). The results indicated that both chloropicrin treatment and covering the soil with sphagnum were beneficial in controlling damping-off.

23.27. Arboriculture

See also *For. Abstr.* 12
(Nos. 182, 229, 754, 874).

293. OUDEN, P. DEN. Coniferen, *Ephedra* en *Ginkgo.* [**Conifers, *Ephedra* and *Ginkgo.***] H. Veenman & Zonen, Wageningen, 1949. pp. 444. 45 refs. [Du.]

A horticultural manual, the chief sections of which give descriptions of species and varieties (horticultural varieties being covered in much detail) arranged alphabetically throughout (pp. 45–370), and an account of methods of cultivation (pp. 371–424), dealing chiefly with methods of propagation and including information on seed collection, storage and treatment, vegetative propagation (layering, cuttings, grafting) and nursery practice generally.

294. **Flowering trees.** *Brooklyn bot. Gdn. Rec.* (*n.s.*) 6 (1), 1950 (1–64 + 16 photos).

A special number, devoted to flowering trees suitable for planting in streets and gardens.

295. WILLIAMS, R. O. **The useful and ornamental plants in Zanzibar and Pemba.** Zanzibar Protectorate. 1949. pp. ix + 497 + 18 plates. 10 refs. Price £1. 0*s.* 0*d.*

296. **New tree mover.** *Amer. Nurserym.* 91 (5), 1950 (40).

The DoALL Co., Des Plaines, Ill., is now producing the Continental tree mover, a device which will handle trees with balls up to 50 in. in diameter and weighing up to 1½ tons. Special features of the device are its great mobility and adaptability to different site conditions, and its light weight.

23.3. *Afforestation*

See also *For. Abstr.* 12
(Nos. 75–7, 262, 316, 318–22, 691).

297. WHYTE, R. O., and SISAM, J. W. B. **The establishment of vegetation on industrial waste land.** *Joint Publ. Commonw. agric. Bur.* No. 14, 1949. pp. xiii + 78 + 60 photos. 83 refs. Price 10*s.*

This publication is the result of a study of the problems and techniques of reclamation of industrial waste land by the establishment of vegetation. Most of the information was collected from unpublished sources such as memoranda or other communications received direct from those who have undertaken the work or are interested in its execution. It is divided into sections on:—present interest and extent of the problem in England, Scotland, Wales, U.S.A., Germany, France, South Africa, and Cyprus; types of waste land; factors affecting treatment; the habitat and plant growth; establishment of vegetation naturally; establishment of vegetation by artificial means (including pasture as well as shrubs and trees); surveying derelict land.

298. BRAMBLE, W. C., and ASHLEY, R. H. **Progress report on spoil bank planting, fall 1949.** *Progress Report, Pennsylvania Agricultural Experiment Station* No. 24, 1950. pp. 6 + 2 photos + 1 map.

Autumn planting has usually been avoided in Pennsylvania, owing to the danger of frost heaving in the first winter, but test plantings on spoil banks made in the present study have been successful so far. Scots Pine, European Larch, and White Ash planted on 8 banks showed an early survival of over 60% through the first winter and early summer. Frost heaving was a serious factor only on those spoil areas which had more than 40% soil and that of a clay texture. Heaving did not occur on the common type of spoil composed of shale with a soil content of 20–40%.

Direct-sowing tests were made in the spring of 1947. Planting gives better results, though Red Oak sown in late March has succeeded well on several banks where sowing was resorted to to fill plantings gaps. Rodents and very dry, hot weather in early summer appear to be the chief causes of failure of sowings.

The possibility of transplanting wild blackberries and raspberries from surrounding areas

:o spoil banks was tested in Sept. 1948. Good survivals were obtained:—74–85% on he outer slope of two banks with blackberry ›ushes and 59% with raspberry. The chief lisadvantage was the cost of digging and moving plants, which was *ca.* $17.50/1,000, compared with $6.00/1,000 plants for State-nursery trees.

299. ISTVÁNFFY, J. Kopárfásítási eljarasok. [**Methods of afforesting barren sites.**] *Erdész. Lap.* 85 (8), 1949 (183–5). 1 ref. [Hu.g.russ.f.e.]

An account of 3 methods of planting on stony, barren sites, carried out before the war, in areas not under State control. The two most successful methods, in the Füzfö district, were (1) contour trenches, 35–40 cm. wide and deep and 120 cm. apart, the stones, gravel etc. being piled to form a trough to catch rain, the plants being dibbled into the trenches at 50 cm. spacing and packed round with transported soil. Though 100% successful, the cost was high and justifiable only on eroding areas urgently requiring afforestation; (2) dibbled planting holes protected by papier-mâché covers *ca.* 40 cm. in diameter. With Hazel, these proved much more successful than holes alone. During their 5–6 years of life, the covers prevent desiccation and weeds, and allow side percolation from heavy rain or melting snow to exert its maximum effect. The plates, costing 2½ fillér each, were supplied by a local factory from waste paper. The author believes that this method would have great possibilities for afforesting shifting sand if the covers were mass-produced.

Both the above methods are of significance in view of the preparatory work now begun, under the Five-Year Plan, for afforesting 20,000 *hold* of eroded land in the Pilis hills, above Budapest.

300. MAGYAR, P. Az alföldfásítás és növényszociológiai alapjai. [**Afforestation of the Great Plain and its plant-sociological bases.**] *Erdész. Lap.* 85 (6; 7), 1949 (130–4; 145–52). [Hu.russ.f.g.]

After an historical review of attempts to tackle this problem, the author on the basis of his own researches makes recommendations for the choice of tree species for certain plant associations. The data are summarized in tables, one for the all-important sandy tracts, (7 associations distinguished) the other for the *szik* or alkaline areas (4 associations (Sigmond-Magyar)). In the former, *Populus nigra, Robinia pseudoacacia, Elaeagnus angustifolia, Pinus sylvestris* and *P. nigra,* are specially recommended according to the association; also deep, and on level sites complete, soil working except on the exposed (windward) side of slopes, with e.g. soil mounds or straw to protect Pine seedlings from sand blast. In the latter, afforestation should be confined to the Sigmond-Magyar Classes I and II, relying chiefly on Oak (*Quercus robur*); complete but not deep working of the soil at least 6 months before planting is essential, planting should be in autumn and, if possible, agricultural crops should be grown on the area both before planting (to reduce weeds) and after (to shelter the transplants).

301. KRAMAROV, I. I. Razvedenie shelyugi na pridonskikh peskakh. [**Growing *Salix acutifolia* on sands in the Don region.**] *Lesn. Khoz.* 1950 (1), (46–7). [Russ.]

In the Gorodshensk forest district in Rostov Province, *Salix acutifolia* was grown on the sands of the bank of the Belaya Kalitva river for sand fixation and protection of Pine and deciduous plantations from sand-storms, to occupy places not fit for Pine or other trees, and as plantations for the basket-furniture industry. It was grown both in blocks and in belts of various widths, at right angles to the prevailing E. and W. winds. Direct plantings were made in ploughed furrows, using unrooted stock—either 2-year-old setts or short cuttings made from 2-year-old rods. Both types proved equally successful. Early spring planting was more successful than autumn planting, which gave good results only when followed by a damp autumn and snowy winter. Regular tending is important, careful weeding of the plantations during the first 2 years being essential. Later tending consists in cutting back the plants. Before this operation most plants of *S. acutifolia* and other shrubby willows make only one shoot. The first cutting is made in the third year, when the root system has established itself. Neglect of cutting after this leads to a decline of root growth, which may even stop and gradually lead to death through lack of water.

Growth varies greatly with soil, and on wind-eroded sands 1-year-old shoots are no more

than 0·5 m. high, the annual crop of osiers being 2·5–3 cu.m./ha. The best yields are produced on humous sandy soils where the shoots attain 1·3 m. in height and the annual crop is 15 cu.m./ha. On clays *S. acutifolia* will not grow at all. Its root system is extensive but shallow, hence its suitability for sand fixation, and drifting stops completely when the plantations are 2 years old. When used to fix sands for a subsequent plantation of Pine, the Willow may be planted either in strips 5–10 m. wide, and 15–30 m. apart, or in rows spaced 1·5–2 m. apart. The Pine is planted 2–3 years later between the strips or rows, and gradually overtops and kills the Willow.

Other species of Willow reported to grow well on these sands and to yield valuable basket osiers are *S. amygdalina*, *S. daphnoides*, *S. pentandra*, *S. lambertiana*, and *S. viminalis purpurea*. All species mentioned are clear cut in the following cycles:—1 year for fine basket osiers, 2 for larger rods, and 4 for furniture rods and walking sticks. The plantation must be kept as dense as possible to reduce damage from heat and dry winds.

302. Bhargava, O. P. **Saline and alkaline soils and their afforestation problems.** *Indian For.* 74 (8), 1948 (1950) (303–6 + 6 photos). 3 refs.

Reports experiments on a strongly alkaline area near Gwalior City, with a high water table and an impermeable pan in the subsoil. Three methods of soil preparation were tried:—(1) trenches 2 ft. deep were filled with non-alkaline soil which was raised in a mound 9–12 in. high; (2) pits 2 × 2 ft. were filled with non-alkaline soil, 3–4 in. higher than ground level at the edges and sloping inwards to the centre; (3) soil was not disturbed, but attempts were made to leach the salts from the surface soil by irrigation before sowing or planting. Sowings on the mounds showed good initial results but seedlings withered during the summer, except where watering was done during the 5 dry months. Rooted cuttings established themselves in the pits when given continuous watering. The imported soil became strongly alkaline after the first dry season. *Prosopis juliflora* proved most successful. *Casuarina equisetifolia* started well, but failed in the 3rd or 4th year. *Tamarix* seeds failed to germinate and cuttings failed.

23.5. *Underplanting. Filling Gaps (Beating up)*

See also *For. Abstr.* 12 (No. 301).

303. Partos, G. Az erdöállomány alsó koronaszintje. **[The lower canopy of forest stands.]** *Erdész. Lap.* 85 (8), 1949 (180–3). [Hu.e.russ.f.g.]

The author stresses the value in a dry country like Hungary of overtopped trees, underwood, and shrubs which maintain soil fertility and moisture. Thus light-demanding species such as Oak, Scots Pine, Robinia and Poplar should be underplanted with shade-bearers such as Hornbeam, Lime and Hawthorn. [Cf. *For. Abstr.* 12 (No. 49).]

304. **Cover crops for hybrid Poplar plantations.** *Rep. Ntheast. For. Exp. Sta. 1949*, 1950 (11).

In a pot experiment at the Beltsville Experimental Forest, 11 different cover crops were tested. It was found that Korean *Lespedeza* did not inhibit the growth of Poplars even when sown so thickly that it eliminated grass and weeds. Buckwheat, though very shallow-rooted, had the most serious effect on the Poplars, effecting a 40% reduction in growth.

23.6. *Care and Inspection of Regeneration in the Initial Stage of Establishment*

305. Hosie, R. C. **Forest regeneration.** *Pulp Paper Mag. Can.* 51 (4), 1950 (114, 116).

Discusses survey methods and the irregularities arising from the use of different sized quadrats.

306. Thomson, C. C. **The advantages of cleaning coniferous plantations when competing vegetation is leafless.** *Silv. Leafl. For. Serv. Can.* No. 36, 1949. pp. 2.

In Sept. 1948, 7 small coniferous plantations, 3–5 years old, which required cleaning, were each divided into 4 equal parts and the parts selected at random for cleaning at 4 allotted times:—Sept. (full leaf), Nov. (leafless), April (leafless) and June (full leaf). Man-hours/acre for cleaning were 14·4 for leafless and 17·3 for leafy conditions. Work under leafy conditions cost, on an average, one-fifth more than work under leafless conditions, largely owing to the increased difficulty in avoiding the planted stock.

24. TENDING OF STANDS AND TREES

See also *For. Abstr.* 12 (Nos. 99, 263).

307. MILAS, B. Razvoj prebornih šuma i smjernice rada na njihovoj obnovi i njezi. [**The development of selection forests and directions for their regeneration and tending.**] *Šum. List* 73 (8/9), 1949 (284–90). [Croat. russ.e.]

A study of the natural development of the mixed Silver Fir and Beech forests of Gorski Kotar, in which the author recognizes 3 stages.

24.2. *Thinnings*

See also *For. Abstr.* 12 (Nos. 811, 822).

308. ŠAFAR, J. Prorede u prebornim šumama. [**Thinnings in selection forests.**] *Šum. List* 73 (6/7), 1949 (205–14). [Croat. russ.f.]

Advice on how to thin the two-storeyed type of forest found in N.W. Croatia, with an overstorey of Fir [*Abies alba*] and Beech [*Fagus sylvatica*] over young Beech and scattered younger Fir.

309. GRUSCHOW, G. F. **Results of a pre-commercial thinning in Slash Pine.** *Sth. Lumberm.* 179 (2249), 1949 (230–2).

In 1935, 3 plots of dense, natural 8-year-old *Pinus caribaea* in the Olustee Experimental Forest, Florida, were thinned to spacings of *ca.* 8, 11 and 15 ft. respectively (*ca.* 700, 400 and 200 trees per acre) with one unthinned control (*ca.* 3,500 trees per acre). In a pulpwood thinning in 1945 the most lightly thinned plot yielded the greatest volume and in the 4 subsequent years showed the highest rate of growth in cords per acre. The expense of the pre-commercial thinnings was met by the increased and earlier yield of more accessible timber.

310. FOIL, J. H. **The Gaylord Pine plantations and forest policy.** *Lumberm.* 77 (4), 1950 (89).

Presents some data on growth of Slash Pine [*Pinus caribaea*] resulting from various types of thinning, and on costs of making and maintaining plantations.

311. BOGGESS, W. R., and LORENZ, R. W. **Growth response of a 17-year-old Loblolly Pine plantation in Southern Illinois to different degrees of thinning.** *For. Note Ill. agric. Exp. Sta.* No. 15, 1950. pp. 1.

24.3. *Opening of the Canopy. Release and Improvement Fellings (including Poisoning and Girdling)*

See also *For. Abstr.* 12 (Nos. 694–700).

312. ROE, A. L. **Response of Western Larch and Douglas Fir to logging release in Western Montana.** *Abstr.* in *Northw. Sci.* 23 (1), 1949 (24–5) [Nth. Rocky Mt. For. Range Exp. Sta.] A.P.B.

A study of the effects of competition and natural vigour on diameter growth 10 years before and after logging in Larch/Douglas Fir stands in western Montana. Western Larch [*Larix occidentalis*] responded better to release than Douglas Fir, but absolute values for Douglas Fir were greater both before and after logging.

313. CROSSLEY, D. I. **Chemical thinning of young stagnating Lodgepole Pine stands.** *Silv. Leafl. For. Br. Can.* No. 42, 1950. pp. 2.

An experiment was made in the use of poisonous sprays ($\frac{1}{6}$ gal. 2,4-D/200 gal. diesel oil; 1 gal. 2,4-D/200 gal. diesel oil; 100 lb. ammate/200 gal. water; 50 lb. ammate/200 gal. water; all per acre) on a 13-year-old Lodgepole Pine stand averaging 226,000 stems/acre. The stand consisted of 78% Pine, 11% Spruce, 9% Willow, and 2% Alpine Fir and Aspen. Results for all 4 treatments, 2½ months after application, are tabulated. The 2,4-D sprays had a selective effect against the Pine, producing 88 and 100% mortality respectively, compared with 0 and 4% for Spruce and 0 for Fir.

314. FOILES, M. W. **Results of poisoning Western Hemlock.** *Abstr.* in *Northw. Sci.* 24 (1), 1950 (32). [Northern Rocky Mountain Forest and Range Experiment Station.] A.P.B.

Ammonium sulphamate (ammate) proved an effective and safe poison when applied as a saturated solution in water or as crystals by means of poisoning-axe holes or notches. A 40% solution of Na_2HAsO_3 in poisoning-axe holes spaced 8 in. apart for small trees, and 4 in. apart for trees over 12 in. diameter is also effective, but is dangerous owing to its extreme toxicity.

315. FOILES, M. W. **Recommendations for poisoning Western Hemlock.** *Res. Note Nth. Rocky Mt. For. Range Exp. Sta.* No. 77, 1950. pp. 2.

Instructions for poisoning with ammonium sulphamate.

24.4. *Shelterbelts. Windbreaks*

See also *For. Abstr.* 12 (No. 707).

316. Savi, L. L'Eucalipto in Sardegna: frangiventi e rimboschimenti nella bonifica di Arborea. [**Eucalypts in Sardinia: windbreaks and afforestation in the reclamation area of Arborea.**] *Ital. agric.* 86 (12), 1949 (751–60). [It.] E.M.B.

Deals with: (1) the afforestation of coastal dunes with *Pinus pinea*, (2) the use of Eucalypts for windbreaks on an area of drained bog. At 13 years of age, the Pine had a mean d.b.h. of 12 cm., mean basal area 0·0116 sq. m., mean height 4·5 m. The volume per ha. was 68·4 cu.m., and m.a.i. was 5·26 cu.m.

Many species of Eucalypt were tried for the windbreaks, including *E. rostrata*, *E. robusta*, *E. resinifera*, *E. globulus*, *E. rudis*, *E. maideni*, *E. botryoides*. *E. rostrata* was particularly successful and stood up well to the cold, salt-laden winter winds. Some Acacias were tried, but they either showed excessive susceptibility to cold (*A. pycnantha* and *A. saligna*) or were of slow growth (*A. melanoxylon*). It has been found that the best arrangement is a series of wide belts (5–12 rows) oriented north and south at intervals of 400 m., with secondary belts (1–2 rows) every 100 m. Planting is done in Feb.–Mar. with 2-year-old transplants, in planting holes 50 × 50 cm. on ploughed land. About 120 g. of complete fertilizer is allowed to each hole. On heavy clay soils, better establishment is obtained by the use of pot plants which, though more expensive, cost no more in the end, owing to reduced losses. The spacing in the primary belts is 3 m. between rows and 2–2·5 m. between plants in rows; in the secondary belts of one or two rows, the plants are spaced 1–1·5 m. apart. Data are given on the system of coppicing adopted for these shelterbelts, 2–3 rows being cut each year.

Studies made at Arborea (1939–40) and in the Agro Pontino (1940 and 1942) have clearly demonstrated that the increased yield from protected fields more than compensates the injurious effects of competition in the immediate vicinity of the belt, which are felt for a maximum distance of 10–15 m. Preliminary results show that, for belts 10 m. high and 30 m. deep the maximum yield of grain occurs between 60 and 90 m. to leeward, and yields superior to those of unprotected crops occur up to 30 m. from the belt. The increase of yield from protected fields varied considerably, but for some 8 fields over a period of 3–4 years, the average increase exceeded 25%.

317. Luncz, G. A szélvédök elhelyezésének rendje az Alföldön. [**The spacing of shelterbelts on the Alföld.**] *Erdész. Lap.* 85 (10), 1949 (228–33). 4 refs. [Hu.russ.f.]

On the basis of Russian and Danish data, makes recommendations for the spacing of shelterbelts in the Alföld.

318. Zukowski, A. A. **Afforestation and Soviet agriculture.** *Timber News* 58 (2130), 1950 (149, 151).

Discusses briefly Soviet research on the effect of shelterbelts in increasing crop yields, the proposed establishment of field belts and of large-scale barrier belts, and some of the difficulties involved.

319. Buchholz, E. Der Kampf gegen die Dürre in der Sowjetunion. [**Methods of combating drought in the Soviet Union.**] *Mitteilungen der Bundesanstalt für Forst- und Holzwirtschaft, Hamburg-Reinbek* No. 12, 1950. pp. 38. 65 refs. [G.] P.R.

Discusses, with maps and illustrations, the soil and climate of forested and non-forested areas of the U.S.S.R., the effect of fellings and of afforestation in the past, and proposed measures for combating drought, including the large-scale establishment of shelterbelts, the stabilization and afforestation of sandy and eroded soils, hydrotechnical measures and closer co-operation between agricultural and forestry bodies.

320. Kharitonovich, F. N. Mezhvidovaya bor'ba i vzaimopomoshch' v stepnÿkh lesnÿkh nasazhdeniyakh. [**Interspecific competition and mutual aid in forest plantations in the steppe.**] *Agrobiologiya* 1948 (6), (50–60). [Russ.] [Vsesoyuznÿ n.-i. Institut Lesnogo Khozyaystva, Pushkino.] C.G.B.

Kharitonovich joins Lÿsenko in denouncing the 'reactionary Malthusian "theory" of over-population and the notion of intra-specific competition which derives from it'. Lÿsenko is stated to have 'established the absence of intra-specific competition and mutual aid, and the presence of interspecific competition and

mutual aid, in plants and animals', and to have applied this principle successfully in practice to the cultivation of the agricultural rubber plant *kok-sagyz*. The present paper claims to confirm Lÿsenko's views by evidence on the behaviour of pure and mixed steppe plantations of Oak at Veliko-Anadol', Mariupol, and on the Kamennaya Steppe [cf. the later papers noticed in *For. Abstr.* 11 (Nos. 289–90]. The facts adduced in support of this position are essentially that whereas Oak in such plantations has been gradually suppressed and killed when planted in mixture with species such as *Fraxinus excelsior*, *Robinia pseudoacacia*, *Acer negundo*, *A. platanoides*, *Betula verrucosa* and *Ulmus* spp., it has been quite successful in dense, pure plantations, in mixture with shrubs and, more rarely, with other tree species which do not compete too vigorously for soil moisture and crown space. High density and admixtures of non-competing species that shade the ground, help the Oak ('mutual aid') to overcome its worst enemy in the steppe—reinvasion by natural steppe vegetation. Some of the author's trials with *F. excelsior* are also quoted. In these, on chernozem at Mariupol, the Ash was suppressed and eventually died out when mixed with Robinia or Poplar. It was also poor and showed poor survival in pure plantations, as its crown is too open to suppress steppe vegetation. In mixture with shrubs or with *A. platanoides*, however, much better results were obtained.

321. Lÿsenko, T. D. Posev polezashchitnÿkh lesnÿkh polos gnezdovÿm sposobom. **[Direct sowing of shelterbelts by the 'nest' [patch] method.]** *Dokl. vsesoyuz. Akad. sel.-Khoz. Nauk Lenina* 1949 (10), (3–21). [Russ.] A.C.P.

A total of about 2,000 ha. of shelterbelt have been sown, with good results so far, by Lÿsenko's 'nest' [patch] method. Autumn sowing is not recommended in view of the risk of frost damage or acorns' being eaten by animals during the winter. [Cf. *For. Abstr.* 11 (No. 289).]

322. Novogrudski, D. M. Mikorizÿ i stepnoe lesorazvedenie. **[Mycorrhizae and steppe afforestation.]** *Mikrobiologiya* 18 (4), 1949 (372–6). 21 refs. [Russ.] [Institut Pochvovedeniya Akademii Nauk Kaz. SSR, Alma Ata.] N.C.L.

A review of the relevant Russian and other literature. Scots Pine and Oak are the foremost species in which large-scale losses are likely to occur in nurseries on steppe soils that have not been under forest. The position as regards Birch, Lime and Beech is not yet clear. Further research is much needed, especially on the question whether it is possible to develop methods of propagating the appropriate mycorrhizal fungi for mass use in steppe plantations.

323. Kas'yanov. Kolichestvennoe i kachestvennoe znachenie roli polezashchitnÿkh lesnÿkh polos. **[The quantitative and qualitative significance of the role of shelterbelts.]** *Lesn. Khoz.* 1950 (1), (38–45). [Russ.] [Bogdinski opÿtnÿ punkt.]

Tabulates and discusses data obtained at the Bogdinsk Experiment Station, Astrakhan, in the semi-desert steppe, under the headings: snow cover, soil freezing and thawing, soil moisture; wind, temperature, air humidity and evaporation; crop yields.

24.5. *Pruning*

324. Davis, E. A. **Effects of several plant growth-regulators on wound healing of Sugar Maple.** *Bot. Gaz.* 111 (1), 1949 (69–77). 18 refs. O.B.D.

Six growth-regulating substances were tested on *Acer saccharum*, but only glutathione at 50 and 100 mg./g. talc had a stimulating effect on wound healing. This was the only compound tested which contained the sulfhydryl group, and it is suggested that such compounds may have a practical use in wound dressings.

325. Wolryche-Whitmore, G. C. **Brashing and pruning conifer plantations.** *Quart. J. For.* 44 (2), 1950 (74–7 + 7 photos).

The importance of brashing and pruning is discussed from the private owner's point of view, emphasis being laid on the immediate benefits to be obtained by making the plantations readily accessible, rather than on the long-term object of producing better-quality timber in the final crop. The author has found the best tools to be the American Forester Pruner (a two-handled secateur-type of tool) for brashing, and the Whitmore Chisel Pruner (designed by himself) for pruning. The chisel pruner is a 3-edged tool with cranked socket so that when the blade lies flat against the bole, the operator's hands are well clear of the tree.

It is mounted on shafts of various lengths up to 10 or 12 ft. The side edge is only of use when on a short handle. Most branches are cut through with one strong upward thrust of 15–24 in., no mallet being used. If the branch is not completely severed, the lower edge is brought down on top of the bough. If taken in time, 75% of the branches are severed with one stroke.

326. Boggess, W. R. **The effect of repeated pruning on diameter and height growth of Slash Pine.** *J. For.* 48 (5), 1950 (352–3).

A study was carried out on 6-year-old *Pinus caribaea.* using 4 treatments (1) no pruning, (2) pruning to ¼ tree height, (3) pruning to tree height, (4) pruning to ¾ tree height, all repeated at intervals of 2 years, over 6 growing seasons. Treatments (3) and (4) significantly reduced diameter and height growth. Treatment (2) produced no significant reduction compared with (1). [Cf. *For. Abstr.* 11 (No. 1820).]

327. Marts, R. O. **Effect of crown reduction on taper and density in Longleaf Pine.** *Sth. Lumberm.* 179 (2249), 1949 (206–9).

Presents the results of experiments begun in 1937 by the U.S. Forest Products Laboratory to study the relationship of crown size to wood formation in Southern Pines, especially its influence on springwood and summerwood proportions in the annual ring, and the distribution of each in the main stem. Crowns of 5 open-grown *P. palustris* were reduced by more than ¾ in March 1947, and further reduced in January 1938, March 1939 and April 1941. In February 1948 these, with controls, were felled and analysed. The crown reduction had a marked effect in reducing the taper of the trunks from the base to about the lower limit of the crowns. The reduction was primarily due to changes in the springwood/summerwood relationships. The average springwood widths in pruned trees were proportionately less of the total ring width at lower levels, and proportionately more at 24½- and 36-ft. levels. The greatest increase in specific gravity was found in the wood that was formed at *ca.* 8- and 12-ft. heights after crown reduction. [Cf. *For. Abstr.* 10 (No. 284); 11 (No. 1820).]

26. TREATMENT OF EXCESSIVELY OPEN STANDS

328. Wahlenberg, W. G., and Doolittle, W. T. **Reclaiming Appalachian brush lands for economic forest production.** *J. For.* 48 (3), 1950 (170–4).

Summarizes the results of experiments in planting White Pine in Laurel 'slicks' in the Appalachians [cf. *For. Abstr.* 11 (No. 1058)], with some indication of costs.

3. FOREST UTILIZATION. FOREST TECHNOLOGY

329. EYRES, H. T. **Introducing wood.** Sir Isaac Pitman & Sons, Ltd., London. 1950. pp. xii + 258. 23 refs. Price 18*s*.

Contains: chapters on basic characteristics, outstanding features of wood, drying, defects and composition, mechanical properties, sources of supply, plywood, preservation, grading, measurement and calculation, conversion, and some principal timbers of commerce; appendixes giving a list of common abbreviations, an explanation of timber terms, and information on research and research institutions in Great Britain; numerous illustrations; and tables and formulae for calculations on plywood, pitwood, round logs and sawn timber.

330. SANDMO, J. K. Skogteknologi. **[Forest technology.]** H. Aschehoug & Co., Oslo. 1948. pp. 561. 38 refs. [Nor.] Price *Kr.* 39.15.

Contains sections on the structure and chemical and physical properties of wood, preservation, the timber trade, felling, measuring, transport (especially floating), sawmilling, planing, wood pulp and cellulose, fibreboards, saccharification, distillation, the manufacture of charcoal and wood gas, turpentine and resins, structural timber and timber engineering, pitprops, sleepers and poles, and wood as fuel. There are numerous illustrations, graphs and tables, and the tools and equipment used in the different operations are described and illustrated.

331. HULME, M. I. **Bibliography on Australian timbers and other forest products. Supplement No. 3.** Div. For. Prod., Coun. sci. industr. Res., Aust. 1949. pp. 18. Cf. *For. Abstr.* 8 (Nos. 1780–1), 10 (No. 2594).

332. VILLIÈRE, M. **Organization of research in France. II. Forest products research.** *Unasylva* 4 (2), 1950 (63–8).

333. PLESSIS, C. P. DU. Die Bosprodukte-Inrigting, Pretoria-Wes. **[The Forest Products Institute, Pretoria West.]** *J. S. Afr. For. Ass.* No. 19, 1950 (6–10 + 4 photos). [Afrik.]

334. SCOTT, M. H. **Timber investigations in the Union of South Africa.** *S. Afr. Timb. Tr. J.* 4 (4), 1950 (8–11).

A brief account of the work of the Forest Products Research Institute, Pretoria West.

335. FENSOM, K. G. **Wood research in Canada. An account of current research into wood utilisation by the Canadian Forest Products Laboratories.** *Wood* 15 (5), 1950 (157–9).

31. PROPERTIES AND ANATOMY OF WOOD. WOOD RESEARCH

31.0 *General Information on Woods*

See also *For. Abstr.* 12 (Nos. 193, 202, 238, 240).

336. **Interim notes on light hardwoods for joinery.** *Sel. Rep. Timb. Developm. Ass., Lond.* No. 9, 1949. pp. 21. P.R.

Describes 35 low-density tropical hardwoods suitable for general joinery purposes, sufficiently soft to be nailed without pre-boring and worked with hand tools, and in the range 30–40 lb. per cu. ft. Gives recommended kiln schedules where these are available.

337. WANGAARD, F. F. **Tropical wood research for the furniture industry.** *Proc. U.S. For. Prod. Res. Soc.* 3, 1949 (72–84). [Yale University, New Haven, Connecticut.] P.R.

Results of tests on the mechanical, physical, seasoning, machining and bending properties of 12 tropical American woods (*Astronium graveolens, Hymenaea courbaril, Bagassa guianensis, Terminalia amazonia, Dicorynia paraensis, Buchenavia capitata, Loxopterygium sagotii, Pseudosamanea guachapele, Tabebuia pentaphylla, Cordia alliodora, Cedrela tonduzii* and *Tabebuia donnell-smithii*) are tabulated and compared with those for some established furniture woods. [Cf. For. Abstr. 11 (No. 1074).]

338. JAY, B. A. **Timbers of West Africa.** Timb. Developm. Ass., Lond. 3rd ed., 1950. pp. 98 + 1 map. 21 refs.

[Cf. *For. Abstr.* 7 (No. 759).] Information on the distribution, properties and uses of about 70 W. African species arranged alphabetically under their British Standard names. Other names (botanical, vernacular and commercial) are listed for each species and included in the index. A list is also given of timbers suitable for different purposes, classified under broad use headings. Substitutes for some of the main commercial timbers are suggested.

339. Scott, M. H. **Notes on the more important African timbers imported into the Union, with special reference to Portuguese East Africa.** *J. S. Afr. For. Ass.* No. 19, 1950 (18–62 + 47 photos).

Nomenclature, sawing, seasoning, general description, structure, working qualities and uses of 42 species, illustrated by microphotographs. Strength properties of 12 species at 12% moisture content are given in a table.

340. Schiffino, J. Riqueza forestal dominicana. Tomo II. Tomo III. **[Dominican forest wealth. Vols. II and III.]** Editora Montalvo, Trujillo. 3rd ed., 1945 and 1947. pp. 239 and 186. [Span.] (*Publicaciones de la Secretaria de Estado de Agricultura y Riego.*)

Further notes on the principal trees. [Cf. *For. Abstr.* 3 (32).]

341. West, W. I. **A collection of Oregon woods.** *Circ. Ore. Sch. For.* No. 1, 1949. pp. 31.

Lists, under species, samples of timber in the collection of the School of Forestry at Oregon State College, giving for each sample the county of collection and the position in the tree, with notes on other characteristics (e.g. whether sap- or heartwood, the type of grain, and the presence of defects).

342. Madeiras brasileiras de exportação. **[Brazilian export timbers.]** *Brasil madeireiro* 6 (59), 1950 (15–21). [Port.]

A list in alphabetical order of vernacular names, giving scientific names, synonyms and the states where the timber is produced.

343. Guinier, P. Le sapin et l'épicéa. **[Fir and Spruce.]** *Rev. Bois Appl.* 5 (5), 1950 (3–8).

Discusses the geographical distribution and site requirements of *Abies alba* and *Picea abies* in Europe and describes the properties and uses of their timbers.

344. **B.C. Coastwoods—Western Hemlock [*Tsuga heterophylla*].** *B.C. Lumberm.* 34 (4), 1950 (60).

345. **Western Hemlock [*Tsuga heterophylla*].** *Wood* 15 (5), 1950 (168).

346. **Specimen woods, Nos. 171–3.** *Suppls.* to *Wood* 15 (3–5), 1950 (91–2; 127–8; 163–4).

Muputu (*Brachystegia spiciformis*); Mjombo (*B. boehmii*); and Sitka Spruce (*Picea sitchensis*).

347. Lamb, G. N. **Foreign woods—origin, use, properties and nomenclature.** *Wood Prod.* 55 (2–5), 1950 (36; 23; 22, 24; 23–4).

(*a*) Philippine Dipterocarps.

(*b*) Mulga (*Acacia aneura*), Cabirma (*Guarea trichilioides*), Chorisia (*Chorisia insignis*), and Piquia (*Caryocar villosum*).

(*c*) Cocobolo (*Dalbergia retusa*), Curupay (*Piptadenia* sp.), Incienso (*Myrocarpus frondosus*), and Lumbayau (*Tarrietia javanica*).

(*d*) Ekki (*Lophira procera*), Jarrah (*Eucalyptus marginata*), Marfim (*Balfourodendron riedelianum*), and Timbersweet (*Nectandra* sp.).

348. Schmidt, E. Übersee-Hölzer Nr. 14–16. **[Foreign woods, Nos. 14–16.]** *Suppls.* to *Weltholzw.* 2 (2–4), 1950. Each pp. 2. 2 + 6 + 4 refs. [G.] P.R.

N'gollon, rotes Khaya-Mahagoni (*Khaya ivorensis*); Doussié (*Afzelia* spp.); and Avodiré (*Turraeanthus africana*).

349. **[Colonial timbers.]** *Bois For. Trop.* No. 13, 1950 (39–52). [F.]

Ilomba (*Pycnanthus kombo*), Landa (*Erythroxylum mannii*), and Niangon (*Tarrietia utilis*).

350. Le Lolako (Lomba). **[*Pycnanthus kombo.*]** *Bull. Compt. Vente Bois congol.* 5 (1) (Ser. No. 28), 1950 (17–22). 6 refs. [F.] P.R.

Lists the commercial and botanical names, describes the habitat and botanical features of the tree, and the structure, properties and uses of the wood.

351. Perrier de la Bathie, H. L'ébène de Madagascar et les arbres qui le produisent. **[Madagascar Ebony and the species producing it.]** *Rev. int. Bot. appl. Agric. trop.* 30 (327/8), 1950 (38–44). [F.f.] P.R.

Of the 24 species producing Ebony in Madagascar, only 8 (*Diospyros calophylla, D. toxicaria, D. hazomainty, D. lenticellata, D. mapingo, D. analamerensis, D. parifolia* and *D. perrieri*) are of commercial value, and these are extremely scarce. Recommendations are made for their re-establishment.

31.1. *Structure. Anatomy. Identification*

See also *For. Abstr.* 12 (Nos. 244, 327, 376, 383, 393).

352. JANE, F. W. **The histology of wood.** *Timber News* 56 (2113–4), 1948 (420–1, 427; 454–6, 468); 57 (2115–26), 1949 (19–21; 62–3, 68; 97–8; 136, 139–40; 182–3; 226–7, 240; 270, 273–5; 317–8; 353–6; 393–5; 437–40; 479); 58 (2127–9), 1950 (16, 19; 69–71; 108).

Describes in detail, with photographs, the structure of softwoods and hardwoods.

353. GOMES, A. M. DE AZEVEDO. O lenho secundário das resinosas. O caso do pinheiro bravo (*Pinus pinaster* Sol. ex Ait.). [**The secondary xylem of resinous trees—*P. pinaster*.**] *Pinhal e Resina* 2 (8), 1949 (51–8). 5 refs. [Port.]

354. METCALFE, C. R., and CHALK, L. **Anatomy of the Dicotyledons: leaves, stem, and wood, in relation to taxonomy, with notes on economic uses.** Clarendon Press, Oxford. 2 vols., 1950. pp. lxiv + 1,500. 2,535 refs. 317 dgms. Price £6. 6*s*.

This reference book aims at providing a summary of our present knowledge of the anatomy of the vegetative organs of the Dicotyledons. It has been written mainly so as to emphasize the taxonomic and phylogenetic value of histology, but it is hoped that botanists who are interested in other aspects of the anatomy of the Dicotyledons will find the book useful as a work of reference. Some attention has accordingly been devoted to ecological and developmental anatomy, and references have been included in the bibliography which should enable workers to find more detailed information concerning these subjects. In addition, an attempt has been made to appeal to a wider range of readers by including, under many of the families, a section headed 'Economic Uses'. In particular it is hoped that this will be of interest to pharmacognosists, foresters, wood technologists, public analysts, and all who have to deal with plant products of economic importance and their microscopical structure.

The descriptions of the individual families are for the most part arranged as follows:—(1) Summary; (2) leaf; (3) axis:—(*a*) stem, (*b*) wood, (*c*) root, (*d*) anomalous structure; (4) taxonomic notes; (5) economic uses; (6) lists of genera described; (7) literature.

355. RENO, J., and KUKACHKA, B. F. **Reno-Kukachka wood identification chart No. 1. Commercial hardwoods. Part 4.** *Wood, Chicago* 5 (4), 1950 (24–5) P.R.

A tabular key for the identification of timbers of Chestnut [*Castanea dentata*], Butternut [*Juglans cinerea*], American Walnut [*Juglans nigra*] and Black Willow [*Salix nigra*], by macroscopic characters.

356. OCCHIONI, P., and MATTOS, A. DE, JR. Estudo anatômico do lenho secundário do puchury-rana, *Ocotea fragrantissima* Ducke. [**Anatomical study of the secondary wood of *O. fragrantissima*.**] *Rodriguésia* 10 (21), 1947 (1–12). 5 refs. [Port.port.]

357. KOBAYASHI, Y. **Anatomical characters of 'Sakudara' [*Meliosma hachijoensis*] wood, Hachido Island.** *Bull. For. exp. Sta., Meguro, Tokyo.* No. 42, 1949 + 6 photos. (27–31). 7 refs. [Jap.jap.e.]

Features specially noted and illustrated by microphotographs are the honeycomb arrangement of vessels (resembling that of *M. oldhami* and *M. rhoifolia*) and their lateral perforation.

358. JENSEN, W. Studium av björkens anatomi. [**A study of the anatomy of Birch.**] *Pap. ja Puu* 32*B* (4*a*), 1950 (7–10 + 24 photos). 10 refs. [Sw.e.] [Institute of Wood Chemistry, Åbo Akademi, Åbo.] P.R.

Results of a study on the anatomy of *Betula verrucosa* are presented in the form of 24 microphotographs, with discussion. They show (1) the general anatomy of Birch; (2) the concentration of the lignin in the wood in the middle lamella; (3) the presence of the lignin in the inner bark in concentrations among the sieve tubes; (4) that the crystallites of the cellulose in the walls of vessels and ray cells lie across the long axis of the cells [cf. *For. Abstr.* 2 47)]; and (5) the annual ring structure of the outer bark. [Cf. *For. Abstr.* 11 (No. 561).]

359. TINCKER, M. A. H. **Structure of cell walls [: the classical theory, modern research and rival hypotheses].** *Fibres, London* 9 (11), 1948 (417–9); 10 (1), 1949 (5–6). 10 refs. L.S.

360. PRESTON, R. D. **The organization of the cell wall in plants in relation to the structure of fibres.** Pp. 218–47 (47 refs.) *in* PRESTON, J. M. [Editor], *Fibre Science*, Textile Institute, Manchester, 1949. [Leeds University]. O.R.S.

Discusses the general composition of the cell wall, the organization of cellulose within it, and the relation between chain orientation and the properties (swelling, heat conductivity and tensile strength) of wood and natural fibres.

361. BERGMAN, S. I. **Lengths of hardwood fibers and vessel segments: a statistical analysis of 49 hardwoods indigenous to the United States.** *Tappi* 32 (11), 1949 (494–8). 12 refs. L.S.

Up to 4 samples of each of 49 indigenous hardwoods were macerated and the lengths of fibres and vessel segments were measured. The results are tabulated, the woods being classified according to fibre and vessel-segment length. The results show that: (1) the difference between average lengths of fibre and vessel segments of 2 samples of the same species may be greater than the corresponding differences for 2 samples from different species; (2) wider sampling is necessary before a mean and standard deviation for lengths in a particular species can be obtained—samples from different parts of the same tree and from trees from varying sites and districts would be needed; (3) there is a high degree of positive correlation between the lengths of the fibres and those of the vessel segments.

362. REINDERS-GOUWENTAK, C. A. **Homogeneous and heterogeneous rays: their characteristics and a key for their identification.** *Meded. LandbHogesch. Wageningen* 49 (6), 1949 (217–36). 17 refs. [E.e.] [Laboratorium voor Algemene Plantkunde, Wageningen.] Price *Fl.* 1.10.

363. CHATTAWAY, M. M. **The development of tyloses and secretion of gum in heartwood formation.** *Aust. J. Sci. Res.* 2*B* (3), 1949 (227–40 + 7 photos). 5 refs. P.R.

The origin of the tyloses and the gum which are commonly observed in the heartwood vessels of numerous species has been traced to the ray cells. Tyloses are developed in the heartwood of species in which the width of the aperture of the pits from vessels to ray cells exceeds approximately 10μ; in woods in which the width of the pit apertures is less than *ca.* 10μ gum is secreted into the heartwood vessels. There is thus evidence that the activity of the ray cells is a very important factor in the blockage of vessels at heartwood formation, and it is suggested that one of the clues to the development of heartwood may lie in the length of the ray cells. *Author's summary.*

364. OHSAWA, M., and HIRAI, S. **The characteristics of stem-wood (chiefly in Japanese Larch).** *Res. Bull. exp. For. Hokkaido Univ.* 14 (1), 1948 (178–212). 18 refs. [Jap.e.]

A detailed study, with numerous graphs and tables, of the proportions of the heart- and sapwood occurring in the stem at different heights and ages and with different crown classes, and their relation to annual rings. Material was taken from 4 different districts of Hokkaido and gave substantially the same results, whatever the site factors, except that the ratio of sapwood appears higher, the warmer the locality. Various correlation coefficients are presented from data obtained on sections at 0·8 m. height above ground; no constant relationship between stem diameter and heartwood area could be found.

31.2. *Physical Properties*

See also *For. Abstr.* 12 (No. 360).

31.21. Texture. Figure. Grain. Conductivity

365. LAMB, G. N. **Burl and swirl and the Strangler Fig.** *Veneers & Plyw.* 44 (4), 1950 (10–1). P.R.

A rare figure in Mahogany, known as burl and swirl, or drappe, has areas of burl usually in bands of irregular size running crosswise. The Strangler Fig when established puts out horizontal flanges round the trunk, and these flanges eventually send rootlets through the bark into the growing tissue of the tree. This constricts regular growth, causing a burl figure, while the area between the bands continues to grow unimpeded, forming a bulge and creating

the swirl effect. The figure is rare; if the tree is attacked young it will die before reaching merchantable size and if it is overmature it will not produce enough growth after attack for the figure to develop.

366. MAKU, T. **Heat conduction in wood: I. Solutions of some examples important in practice. II. Interior temperature of plate when heated with hot steel plates.** *Wood Res., Kyoto* No. 3, 1949 (1–36; 37–59). 28 refs. [Jap.e.]

(I). Some 108 equations are presented for calculating the distribution of heat in timber (logs, boards, long and short round timber etc.) when it is heated by steaming, or hot pressing, or in hot water or hot air.

(II). To obtain data for calculating the interior temperature of plywoods during hot-press manufacture, the temperature of the mid-plane of a wooden plate between 2 electrically-heated steel plates kept at constant temperatures was measured. Measurements were made on wood of different thicknesses and moisture contents. Results are given in graphs and tables and a formula is presented for calculating the temperature to be expected in different heating conditions.

367. WITTKOPF, J. J., and MACDONALD, M. D. **Dielectric properties of Douglas Fir at high frequencies.** *Bull. Ore. Engng. Exp. Sta.* No. 28, 1949. pp. 39. 4 refs.

[Cf. *For. Abstr.* 11 (Nos. 330–1, 1092).]

Preliminary work indicated that the variables with most effect on the dielectric constant (K) and power factor (p.f.) of Douglas Fir are frequency, moisture content, wood density and grain direction. Results of experiments on the effect of these variables are given in graphs. (1) *Frequency*: In the frequency range investigated, from 2 to 40 megacycles/second, K decreases and the p.f. increases with increasing frequency. (2) *Moisture content*: Within the range oven-dry to 15% moisture content, K shows a large and the p.f. a lesser increase with increasing moisture. (3) *Wood density*: Denser wood has a larger value of K and generally a somewhat larger value of p.f. (4) *Grain direction*: K and p.f. are both rather larger for vertical grain (with the grain direction perpendicular to the electrode surfaces and parallel to the electric field) than for flat grain (grain direction parallel to the electrode surfaces and perpendicular to the electric field). All the data were taken at temperatures near to normal room temperature.

368. WITTKOPF, J. J., and MACDONALD, M. D. **Dielectric properties of Ponderosa Pine at high frequencies.** *Bull. Ore. Engng. Exp. Sta.* No. 29, 1949. pp. 23. 4 refs.

The effect of variations in frequency, moisture content, and wood density on the dielectric properties of Ponderosa Pine is similar to that obtained for Douglas Fir [cf. preceding abstract] but the effect of grain direction appears to be less significant. In general, the samples had a slightly greater value of power factor and dielectric constant for vertical grain. Medium-density Ponderosa Pine (0·40) had a larger value of dielectric constant for vertical grain in oven-dry samples, but a larger value for flat grain at 10 and 15% moisture. The power factor was slightly greater for flat grain at all moisture contents.

31.22. Relation to Water, Air, Gases

See also *For. Abstr.* 12 (No. 591).

369. KADITA, S., and NAKATU, K. **On the hygroscopicity of Kiri (*Paulownia tomentosa* Steud.) wood.** *Wood Res., Kyoto* No. 2, 1949 (22–40). 22 refs. [Jap.e.] P.R.

The hygroscopicity of Kiri was compared with that of Buna (*Fagus crenata*), Nara (*Quercus serrata*), Katsura (*Cercidiphyllum japonicum*) and Sugi (*Cryptomeria japonica*). The maximum moisture-absorption capacity of Kiri is the lowest of the 5 species, about ⅓ that of Buna. The course of absorption up to maximum moisture content is similar for all species. The swelling volume of Kiri, 6·3%, is the lowest, about ⅓ that of Buna. Variation in moisture content at constant temperature and humidities varying from 20 to 100%, and at constant humidity and varying temperatures, is lowest for Kiri. The maximum water-absorption capacity of Kiri is rather larger and the rate of water absorption is rather lower at moisture contents of 0–60% than for the other species.

370. BELL, E. R., and KRUEGER, N. T. **Effect of plywood glue lines on the accuracy of moisture-meter indications.** *Prepr. U.S. For. Prod. Res. Soc.* 68, 1949. pp. 7. [U.S. Forest Products Laboratory, Madison.] P.R.

The moisture content of samples of plywood of different numbers of plies and made with 10 different glues, as determined by moisture meters, was compared with that of controls in the form of veneers clamped together. For 9 of the glues, the moisture content was significantly higher for the plywood than for the control. Errors increase in size with the number of glue lines, and depend also on the type and batch of glue, the actual moisture content of the plywood, and on the individual moisture meter. They are probably caused by the presence in the glue of electrolytes that become conductors when in contact with moisture in the wood. It is concluded that little confidence can be placed in moisture-meter readings for plywood.

31.23. Weight. Specific Gravity

See *For. Abstr.* 12 (Nos. 327, 403).

31.25. Hardness. Resistance to Abrasion

371. YOUNGQUIST, W. G., and MUNTHE, B. P. **The abrasive resistance of wood as determined with the U.S. Navy wear-test machine.** *Rep. U.S. For. Prod. Lab., Madison* No. *R*1732, 1948. pp. 8 + 1 photo, 2 dgms., 24 gphs., 2 tbls. P.R.
[Cf. *For. Abstr.* 11 (No. 2760).]

31.27. Mechanical Strength

See also *For. Abstr.* 12
(Nos. 466–9, 622, 666).

372. **Methods for conducting mechanical tests of sandwich construction at normal temperatures.** *Rep. U.S. For. Prod. Lab., Madison* No. 1556 (rev.), 1950. pp. 17. P.R.

373. MÖHLER, K. Tragkraft und Querkraft von ein- und mehrteiligen Holzdruckstäben nach Rechnung und Versuch. **[Bearing strength and transverse strength of simple and compound wood compression samples by calculation and experiment.]** *Bauplanung und Bautechnik, Berlin* 2 (2), 1948 (41–8). [G.] L.C.E.

374. PEREM, E. Invérkan av belastningsökningen på böj- och tryckhållfastheten hos trä. **[Effect of speed of loading on the strength properties of wood tested in compression and bending.]** *Medd. svenska TräforsknInst.* (*Trätekn. Avd.*) No. 20, 1949. pp. 8. 8 refs. [Sw.sw.] P.R.

Tests of compressive and of static and impact bending strengths showed that resistance values increase with the rate of loading. The results are given in graphs and tables.

375. [PEARSON, R. G.] **Queensland grown White Cypress Pine. Mechanical properties.** *Aust. Timb. J.* 15 (12), 1950 (855). [Div. For. Prod., Coun. sci. industr. Res. Aust.]

Callitris glauca, particularly in the green state, compared favourably with 5 other species of similar density (*Araucaria cunninghamii*, *Pinus radiata*, *Eucalyptus gigantea*, *Pseudotsuga taxifolia* and *Eucalyptus marginata*), but it is much less stiff and less resilient. Its strength in compression perpendicular to the grain is outstanding and equals or exceeds that of *E. marginata*. After drying, a reduction in modulus of rupture, and to a lesser extent in shear strength, was observed. With the dry wood the impact strength and stiffness were low.

31.3. *Chemical Properties*

See also *For. Abstr.* 12
(Nos. 358, 360, 520–1, 529, 556, 596).

376. SINGH, K. **Contribution of non-cellulosic constituents to the fine structure of plant fibres [: a review].** *Indian Pulp & Paper, Calcutta* 4 (4), 1949 (164–7). 51 refs.

377. WACEK, A. VON. **Some new contributions to recent progress in the chemistry of lignin [: a review].** [*Proceedings of the*] *Fourth Meeting of the* [*F.A.O.*] *Technical Committee on Wood Chemistry, Brussels* 1949 (13, 160–6). 16 refs. P.R.

378. AULIN-ERDTMAN, G. Ligninets ultravioletttspektrokemi. **[The ultra-violet spectrochemistry of lignin.]** *Pap. ja Puu* 32*B* (2), 1950 (51–9). 22 refs. [Sw.e.] [Cellulosaindustriens Centrallaboratorium, Stockholm.] P.R.

Cf. *For. Abstr.* 11 (Nos. 2774–5).

379. CASTAGNE, E. **Remarks on testing Congo woods for lignin.** [*Proceedings of the*] *Fourth Meeting of the* [*F.A.O.*] *Technical*

Committee on Wood Chemistry, Brussels 1949 (12, 150–5). P.R.

Results of experiments on *Terminalia superba*, *Pterygopodium balsamiferum*, and *Antrocaryon micraster* show that no single method of lignin determination is suitable for all tropical species. Methods of sampling and of chemical analysis are described in detail.

380. SCHUBERT, W. J., and NORD, F. F. **Studies on softwood lignin.** *American Dyestuff Reporter, New York* 38 (19), 1949 (686). [Fordham University, New York 58.] L.S.

Sound samples of softwoods (Scots Pine and White Fir) were infected with 3 brown-rot fungi (*Lentinus lepideus*, *Lenzites sepiaria* and *Poria vaillantii*), the residual materal was analysed, and chemically unaltered lignin was isolated from the decayed wood. The cellulose content was found to be reduced, with a relative increase in lignin content. After a limited period of decay, the yield of alcohol-extractable lignin was approximately double that obtained from sound wood. 'Native' lignin of Scots Pine and that obtained by enzymatic decay appeared to be identical. [Cf. *For. Abstr.* 11 (No. 1111).]

381. COHEN, W. E. **Investigation of Eucalypt lignins.** [*Proceedings of the*] *Fourth Meeting of the* [*F.A.O.*] *Technical Committee on Wood Chemistry, Brussels* 1949 (12–3, 156–9 + 1 gph). 4 refs. P.R.

A methanol cooking process applied to *Eucalyptus regans* is described, and the reactions taking place during cooking are discussed. The properties of the methanol lignin are compared with those of other isolated lignins. The ratio of syringaldehyde to vanillin in the aldehyde mixtures prepared from the methanol lignin of different *Eucalyptus* spp. by alkaline nitrobenzene oxidations varies with the species.

382. AGGARWALA, J. C. **Nature of Bamboo lignin.** *Indian Pulp & Paper, Calcutta* 4 (1), 1949 (12–4, 17). 11 refs. [Shree Gopal Paper Mills Ltd., Abdullapur.] L.S.

Literature on Bamboo lignin is reviewed, and results of the author's recent experiments on lignin of *Dendrocalamus strictus* are tabulated.

383. HAAS, H. Untersuchungen über den morphologischen und chemischen Aufbau von Holzcellulosefasern. **[Research on the morphological and chemical structure of wood-cellulose fibres.** *Makromolekulare Chemie, Freiburg im Breisgau* 3 (2/3), 1949 (117–31). 32 refs. [G.g.] [Forschungslaboratorium der Zellstoffabrik Waldhof, Wiesbaden-Kostheim.] L.S.

The outer layer of the secondary cell wall is shown to consist of wood polyoses. The inner layer consists of substances which can be converted by hydrolysis and acetylation to difficultly soluble compounds. The middle layer consists of fibrils, laminae and cross spirals. In the conifers, longitudinal fibrils are surrounded by lignin, which is perhaps chemically combined with cellulose. When the lignin is dissolved, a layer of cellulose of varying reactivity remains. The chief structural element of the cross-spirals appears at once when the fibres are swollen in concentrated H_2SO_4.

384. SVEDBERG, T. **The structure and polymolecularity of cellulose.** *Transl. For. Prod. Aust.* 1949. pp. 7 + 15 photos, 1 dgm., 14 gphs. P.R.

Transl. by E. Selman-Towt from *Svensk Papp Tidn.* 52 (7), 1949 (157–64).

385. COHEN, W. E. **Acid-sensitive links in Eucalypt cellulose.** [*Proceedings of the*] *Fourth Meeting of the* [*F.A.O.*] *Technical Committee on Wood Chemistry, Brussels* 1949 (11–2, 146–9 + 2 gphs.). 4 refs. P.R.

386. HIRST, E. L., ISHERWOOD, F. A., JERMYN, M. A., and JONES, J. K. N. **Pear cell-wall cellulose.** *Journal of the Chemical Society, London*, Suppl. issue No. 1, 1949 (5182–4). 7 refs. O.R.S.

A comparison of the properties of Pear cell-wall and cotton celluloses is made and shows that the two are similar. The chain length of the Pear cellulose appears to be much shorter than that of the cotton, but this is probably due to the degradation caused by the drastic purification necessary to remove the other polysaccharides.

387. TACHI, I., and YAMAMORI, N. **Studies on hemicelluloses. 1. On the extraction of hemicelluloses from the trunk sawdust of *Prunus serrulata* Lindl. var. *spontanea* Makino (Yamazakura) and their fractionation. 2. On hydrolysis and composition of hemicelluloses prepared from the trunk sawdust of Yamazakura.** *Wood Res., Kyoto* No. 4, 1950 (1–18). 32 refs. [Jap.e.]

(1) The solubility of the hemicelluloses increases with the degree of preliminary delignification, supporting the theory that some hemicelluloses are associated with the lignin in the cells. Yield of hemicelluloses is influenced by time and temperature of treatment, and concentration of the alkali. The optimum pH for the precipitation of fractionated hemicelluloses is rather acid. The yield and purity of hemicelluloses are influenced by the Cu reagents and acids used in purification and by the reaction temperature. The physical and chemical properties of the hemicellulose fractions were examined. (2) The hemicellulose fractions yielded on hydrolysis xylose and glucuronic acid. The same Ba salt of xylo-glucuronic acid ($C_{22}H_{34}O_{22}Ba$), soluble in water and insoluble in ethyl alcohol and ether, was isolated from the hydrolysed solutions of all hemicellulose fractions. By the isolation of Ba salts of xylo-glucuronic and glucuronic acid it was found that all the hemicelluloses were 'polyuronide' hemicelluloses. *From authors' summary.*

388. SUNDMAN, J., SAARNIO, J., and GUSTAFSSON, C. Papperskromatografisk undersökning av kolhydratsammansättningen i några trädslag. [**Paper partition chromatography research on the carbohydrate composition of some tree species.**] *Papp. Trävarutidskr. Finl.* 31 (24), 1949 (467–71). 14 refs. [Sw.e.] P.R.

Hydrolysates of wood from 6 species (*Picea abies*, *Pinus cembra*, *Juniperus communis*, *Thuja occidentalis*, *Salix* sp. and *Betula verrucosa*) were examined. Glucose, xylose, mannose and galactose were present in all the species; arabinose was present in all the softwoods but absent or present in only small quantities in the hardwoods. Special tests failed to show the presence of lyxose in *Picea abies*.

389. WISE, L. E., and RITTENHOUSE, R. C. Das Vorkommen von Arabinoseeinheiten in Kiefernholz und einem Kraftzellstoff. [**The presence of arabinose units in Pine wood and in a kraft pulp.**] *Papier, Darmstadt* 3 (17/18), 1949 (337–9). 18 refs. [G.g.] [Institute of Paper Chemistry, Appleton, Wis.] L.S.

Cf. *For. Abstr.* 11 (No. 2792.).

390. ERDTMAN, H. **Heartwood extractives of conifers.** *Tappi* 32 (7), 1949 (305–10). [Kungl. Tekniska Högskolan, Stockholm.] L.S.

Pines possessing a large proportion of heartwood, with a high pinosylvin content evenly distributed, should be selected for seed production. The colorimetric investigation of heartwood samples could be carried out easily and quickly in the forest by untrained personnel. Pines (even 'élite' Pines) with low concentration or uneven distribution of pinosylvin, yield timber readily attacked by fungi and insects and should be removed and used for kraft pulp. Pinosylvin and its mono- or dimethyl ether appear to be characteristic of nearly all species of Pine. Other constituents occur in limited groups of Pine and there is reason to believe that it may be possible to check the taxonomic system based on purely botanical evidence by independent study of the chemical constituents of heartwoods. Pinitol is present in all the *Haploxylon* and none of the *Diploxylon* Pines so far examined. Other constituents frequently found in *Haploxylon* Pines are flavones, e.g. chrysin and tectochrysin, and the corresponding flavanones, pinocembrin and pinostrobin; strobopinin and cryptostrobin have also been found. The flavanones, pinocembrin and pinostrobin, are frequently found among the *Diploxylon* Pines, but not the corresponding flavones. *P. banksiana* and *P. contorta*, which are botanically closely related, both contain pinobanksin, a very peculiar hydroxy derivative.

The chemical relationships between genera of the Pinaceae are discussed and tabulated; interrelations are still lacking between *Cedrus*, *Abies* and *Keteleeria* and other genera of the family. The chemistry of other Coniferae is discussed and related to the durability of the timbers. Only a small number of conifers has so far been chemically examined.

391. BISSET, I. J. W. **Irritant properties of Miva Mahogany.** *For. Prod. News Lett. C.S.I.R.O. Aust.* No. 178, 1949 (3).

Complaints had been received of headaches and heaviness in the lungs after working on Miva Mahogany (*Dysoxylum muelleri*), and preparation of sawdust for chemical examination produced the same symptoms. A fine white crystalline substance isolated from extracts of the timber will be examined for its

pharmacological properties. Examination of cross-sections of the timber showed the presence of many white deposits in the parenchyma cells of the numerous concentric parenchyma bands. These appeared under the microscope as closely packed globules of a transparent substance. Other species (11 in all) of *Dysoxylum* examined did not contain these globules.

392. NIKITIN, N. I., RUDNEVA, T. I., ZAITSEVA, A. F., and CHOCHIEVA, M. M. **Study of the chemical composition of Oak wood as influenced by the type of forest.** *Transl. For. Prod. Aust.* 1949. pp. 14 + 6 tbls. Transl. by P. A. Gibson from *Zhurnal prikladnoy Khimii, Leningrad* 22 (1), 1949 (67–78).

Analyses of samples of Oak were made, giving the following results, which are tabulated: (1) Differences in chemical composition are very slight between samples from different types of forest, and are rather less than between individual trees in the same forest. (2) Chemical differences in wood from different geographical zones are also very slight. (3) Substantial differences were found between 16 samples of the same age not divided by forest type or region. (4) In wood from different heights in the trunk, slight increases were found in the contents of lignin and uronic acid, and a slight decrease in tanning agents. (5) Heartwood, as compared with sapwood, shows a considerably higher content of tannins, a slightly higher content of cellulose and pentosans, and a slightly lower content of lignin. (6) Slightly less cellulose was found in thick branches than in the base of the trunk; otherwise their chemical composition was similar to that of trunk wood. The content of tannins was very much less in the wood from twigs than in that from the trunk.

31.4. *Durability. Decomposition*

See also *For. Abstr.* 12 (Nos. 404, 409).

393. VAROSSIEAU, W. W. Opgegraven en aangetast hout uit biologisch oogpunt gezien. **[Buried and decayed wood from a biological aspect.]** *Repr.* from Beekman, W. B., *Hout in alle Tijden,* [A. E. Kluwer, Polstraat 8–10, Deventer]. 1949. pp. 331–87 + 4. 128 refs. [Du.du.e.] [Afdeling Hout, Central Instituut voor Materiaalonderzoek, Delft.]

A study was made of changes in the cell-wall structure of Spruce (*Picea abies*), Pine (*Pinus sylvestris*) and Fir (*Abies alba*) from the foundations of buildings in Rotterdam after periods of 30–600 years underground, of lignite, fossil wood and jet, and of wood attacked by fungus from a church in The Hague. The following conclusions are drawn for buried wood below the ground-water level: (1) that decomposition starts at the surface and extends inwards at different rates; (2) that in individual growth rings, decomposition starts with ray cells and proceeds to the fibre tracheids near the boundary of the growth ring and adjacent to the rays; (3) that mechanical strength gradually decreases with the disintegration of the cellulose, and shear failure may develop. Such failures appeared first in Rotterdam wood 260 years old, occurring first in cells of the early wood, although deterioration starts in the walls of the latewood cells; (4) that the similarities in structure between the older buried wood, fossil wood, lignite and petrified wood, indicate that the characteristic changes in the Rotterdam samples are the first of a series of changes undergone by wood during conversion to coal or petrifaction; and (5) that deterioration of wood buried in anaerobic conditions is not caused by fungi. The work is illustrated by microphotographs.

31.42. Attack by Plant Organisms

See also *For. Abstr.* 12 (Nos. 380, 427–9, 518–9, 536–7, 570–2).

394. JENNISON, M. W. *et al.* **Physiology of the wood-rotting fungi. Report 2. January-December, 1949.** *Summary Technical Report, U.S. Office of Naval Research* No. *NR*–034159, 1950. pp. 46. [Syracuse University, Syracuse, N.Y.]

Cf. *For. Abstr.* 11 (Nos. 356, 1131).

395. LAW, K. **Phenol oxidases in some wood-rotting fungi.** *Ann. Bot.* 14 (53), 1950 (69–78). 24 refs. [University of Melbourne.] O.R.E.

Experiments were undertaken to identify in certain types of wood-rotting fungi the agent responsible for decolorizing dyes. In white wood-rotting fungi decolorization is caused by a specific phenol oxidase. Brown rots do not contain this enzyme in significant amounts, and

cause no decolorization. The action of the phenol oxidase of white rots is similar in some respect to that of laccase, though the substrate specificity differs. Some brown rots contain a phenol oxidase which, according to its reactions, resembles tyrosinase of mushroom and potato. Others show a negligible phenol oxidase reaction. *From author's summary.*

396. NORKRANS, B. **Influence of cellulolytic enzymes from hymenomycetes on cellulose preparations of different crystallinity.** *Physiol. Plant., Copenhagen* 3 (1), 1950 (75–87). 28 refs. [E.e.]

In the course of experiments designed to perfect a sensitive, rapid method of testing for cellulose decomposition, a culture in which *Tricholoma fumosum* had been grown for 25 days was separated from the cellulose-mycelial mats and transferred into test tubes with precipitated cellulose, where it caused a rapid decrease in the extinction values of the solution. The two wood-rotting fungi, *Polyporus annosus* and *Coniophora puteana*, behaved in the same way, but their effect, particularly that of *C. puteana* was more marked. The results may be considered as a proof that an extracellular, cellulolytic enzyme is produced by the growing mycelia of these fungi.

397. NORD, F. F. **Mechanism of methyl *p*-methoxycinnamate formation by *Lentinus lepideus* and its significance in lignification.** *Proceedings, 6th International Congress of Experimental Cytology* 1949 (307–8). *Chem. Abstr.* 43 (22), 1949 (9172). P.R.

Cf. *For. Abstr.* 11 (No. 1111).

398. SCHULZE, B., and THEDEN, G. Versuche zur Trockenstarre des im Holz befindlichen Myzels von Bauholzpilzen. **[Research on the resistance to dryness of the mycelium in wood of fungi attacking structural timbers.]** *Repr.* from *Phytopathologische Zeitschrift, [Berlin]* 15 (4), [1945] (482–94). 10 refs. [G.g.] [Materialprüfungsamt Berlin-Dahlem.] P.R.

Poria vaporaria was very resistant to extreme dryness over long periods (up to 1½ years). *Lenzites abietina, L. sepiaria* and *Lentinus lepideus* were also very resistant, *Coniophora cerebella* and *Merulius lacrymans* very much less so. Results are tabulated.

399. MATHIESEN, A. **The nitrogen nutrition and vitamin requirement of *Ophiostoma pini*.** *Physiol. Plant., Copenhagen* 3 (1), 1950 (93–102). 13 refs. [E.e.]

The common blue-stain fungus, *O.* [*Ceratostomella*] *pini*, is partially heterotrophic with respect to aneurin and biotin. The pigment production is not dependent on the quantity of mycelium produced or on the age of the cultures. In some media, such as NH_4Cl, the same amounts of mycelium are found as on nitrates but they are entirely colourless. Metals had no influence on pigment formation. Pigment production is apparently closely bound up with the assimilation process and some process of oxidation. *From author's summary.*

31.43. Attack by Animal Organisms

See also *For. Abstr.* 12 (Nos. 241, 573–82, 758, 778).

400. HOF, T. Serie II. Aantasting No. 3. Aantasting van hout door klopkevers (Anobiidae). **[Series II. No. 3. Attack on wood by Anobiidae.]** *Circ. centr. Inst. Mater. Onderzoek Afd. Hout* No. 12, 1949. pp. 16. 64 refs. [Du.e.] P.R.

A review of literature.

401. SISLEY, C. **The beetle population.** *Timber News* 58 (2130), 1950 (143–4). (*Monthly Bulletin of the British Wood Preserving Association*, April, 1950.)

A possible cause of the increase in the population of the death-watch beetle (*Xestobium rufovillosum*) in churches during the last 50 years is the installation of heating, with consequent condensation of moisture on the roof timbers. Part of the increase of the furniture beetle (*Anobium punctatum*) can be attributed to the storing of a good deal of furniture during the war; but this does not account for the infestation of large numbers of small suburban houses which were tenanted throughout the war.

402. PLANK, H. K., and DELGADO, R. F. **Bamboo susceptibility.** *Rep. Fed. Exp. Sta. Puerto Rico* 1949 (15).

Data on the relative susceptibility to attack by powder-post beetle, of *Dendrocalamus strictus* and *Bambusa vulgaris*, and of culms of different ages.

31.8. *Quality and Defects of Timber*

403. PAUL, B. H. **Wood quality in relation to site quality of second-growth Douglas-Fir.** *J. For.* 48 (3), 1950 (175–9). 9 refs.

[Cf. *For. Abstr.* 9 (No. 2291); 10 (Nos. 305, 2622); 11 (No. 1099).] Specific gravity in fully stocked stands of second-growth Douglas Fir averaged lower for site quality II than for site quality IV. Open-grown trees from site II were somewhat lower in specific gravity than the forest-grown trees.

Specific gravity increased as the percentage of summerwood of the growth rings increased. The specific gravity was lower, however, for wide-ringed wood than for narrow-ringed wood having the same percentage of summerwood.

Wood produced in a 100-year stand on site II did not equal old-growth Douglas Fir in average specific gravity until the growth in diameter of the trees had slowed to more than 10 rings per inch when the trees were 60 years of age. In the site-IV stand, wood produced after the first 30 years of growth was equal to or above the average for old growth in specific gravity.

Shrinkage values of second-growth Douglas Fir did not show important differences in wood from the two sites, nor in that from various positions in the tree. In general, they were close to similar values for old-growth Douglas Fir.

There was a consistent relationship between specific gravity and strength (modulus of rupture) of second-growth Douglas Fir when results of all tests were considered together. In general, the average strength values of second-growth Douglas Fir from the different sites followed the order of average specific gravity values. *Author's summary.*

404. CORMIO, R. Legno e legnami indigeni ed esotici—difetti, cause, rimedi. [**The defects of wood (both indigenous and exotic timbers), their causes and remedies.**] Ulrico Hoepli, Milan. 1949. pp. xvi + 502. 146 refs. [It.] Price [£2. 3*s.* 6*d.*].

Illustrated by over 300 photographs and drawings, mostly of specimens in the author's collection. [Cf. *For. Abstr.* 9 (Nos. 329, 913); 10 (No. 1135).]

405. ROTH, E. R. **Discolourations in living Yellow-Poplar trees.** *J. For.* 48 (3), 1950 (184–5).

Artificial inoculation of living *Liriodendron tulipifera* trees with bacteria isolated from discoloured logs and veneer, showed no significant difference in the inoculated trees and the controls (wounded but not inoculated). There was, however, significantly more discoloration round wounds which held water (in both inoculated and untreated trees) than round drained wounds. It is concluded that the common discoloration (not due to decay) found in this species is probably the result of oxidation rather than bacterial or fungal infection. [Cf. *For. Abstr.* 5 (p. 260), 6 (p. 29).]

32. HARVESTING OF WOOD. LOGGING

See also *For. Abstr.* 12 (Nos. 513, 855–9).

406. **Characteristics of logging in Finland.** *Metsät. Aikak.* 1949 (6/7), (197–9). [E.]

407. SIMMONS, F. C. **Logging farm forest crops in the northeast.** *Fmrs'. Bull. U.S. Dep. Agric.* No. 2008, 1949. pp. 57.

Includes sections on:—choice and use of equipment, lay-out of operations, felling, limbing, cross-cutting, skidding, loading and hauling.

32.1. *Marking of Trees and Coupes*

See also *For. Abstr.* 12 (Nos.5, 788).

408. QUAITE, J. **Marking costs in a White Spruce stand.** *Silv. Leafl. For. Br. Can.* No. 44, 1950. pp. 2.

32.2. *Felling and Related Operations*

32.24. Felling Season

409. MCINTOSH, D. C. **Project 129. Treatment of trees with chemicals (Stevens, Ontario). Transpiration experiment. Observations of trees felled and left with foliage intact (changes in weight, ease of peeling and condition of wood).** *Mimeo. For. Prod. Lab., Can.* No. 0–141, 1949. pp. 16.

Trees of Jack Pine (*Pinus banksiana*), Black Spruce (*Picea mariana*), Balsam Fir (*Abies balsamea*), Aspen (*Populus tremuloides*), Balsam Poplar (*P. balsamifera*) and White Birch (*Betula papyrifera*) were felled and left with foliage intact for different periods of time. Significant reductions of weight, generally increasing progressively with length of time after felling, were found for Jack Pine, Balsam Fir, Balsam Poplar and White Birch, but not for Black Spruce and Aspen; the apparent absence of reduction in weight in the last two can probably be explained by variations in basic density of the individual trees sampled after different periods, as there was evidence of some reduction in moisture content. The amount of sunlight falling on the trees after felling affected the amount of reduction in weight. Bark was harder to remove with hand peeling tools for intact-foliage stems than from control trees felled at the same time. Traces of bark insects were present in most of these trees, and of blue-stain only in one group of Jack Pine left for 36 days before sampling. The attack by insects and stain had no appreciable effect on the value of the wood for pulping. Results are tabulated.

32.25. Felling and Initial Conversion

See also *For. Abstr.* 12 (No. 409).

410. [POND, T. M.] **Power saws.** *Woodl. Sect. Mem. Canad. Pulp Pap. Ass.* No. 14–50, 1950. pp. 5.

Presents and discusses answers to a questionnaire on power-saw performance.

411. KUEMMERLING, K. K. **Using the chain saw correctly.** *Trees, Cleveland, Ohio* 10 (2), 1950 (6–7, 12–3).

Safety rules for the use of the chain saw, prepared by the safety committee of the National Arborist Association.

412. GEBAUER, M. Silnikowa piła łańcuchowa. **[Power chain saws: construction, maintenance, operation.]** *Wydaw. pomocn. tech.-gosp. Inst. Bad. Leśn.* No. 19, 1949. pp. 106 + 2 tbls. 8 refs. [Pol.]

Much of this bulletin, intended as a handbook for Polish foresters, consists of detailed descriptions, with diagrams and illustrations, of (1) electrical, (2) petrol, and (3) compressed-air portable and semi-portable saws, their operations and comparative merits. Electrical types are praised (Kharlamov's 8·5-kg., 3-phase-A.C., 220–40 volts, 175 cycles) being adjudged the best of 4 Russian makes cited; but those of Russian manufacture cannot be used in Poland, because the current there has too low a frequency, while the general lack of electrical equipment favours petrol-driven saws. Those described include 2 Russian, one Czechoslovakian and one Swiss make (Hunziker, B.K.S.), the last being highly recommended. Comparative performance data collected by Douda in Czechoslovakia for several types of saw and for workers of varying skill are tabulated and discussed.

413. ARO, P. Metsäsahojen kunnostamisen pääperiaatteet. **[Forest saws: chief points in maintenance.]** *Julk., Metsäteho, Helsinki* No. 1, 1945 (55–67). [Fi.]

With a short illustrated historical introduction.

414. **New tree falling device.** *Sth. Lumberm.* 180 (2253), 1950 (70).

Describes a new tree jack, with a double, follow-through spring, which enables a falling tree to be thrown in the exact direction required. The base has lugs to prevent slipping on frozen ground or ice, and there is a special 4-pronged fork at the top which will not slip or stick into the tree. The whole apparatus weighs about 30 lb. It is manufactured by Jacobs Wind Electric Co. Inc. of Minneapolis, Minn.

415. PUTKISTO, K. Tutkimuksia vanerikoivujen hankinnasta II. Aikatutkimuksia vanerikoivujen rasiinkaadosta, karsimisesta ja katkomisesta. **[Investigations on the logging of veneer Birches II: Time studies on the summer ('sour') felling, trimming and cross-cutting of veneer Birches.]** *Julk., Metsäteho, Helsinki* No. 5, 1947. pp. 80. [Fi.e.]

A detailed analysis involving 23 two-man crews and *ca.* 8,000 stems. The 47 tables and 23 graphs carry English captions.

416. MAKKONEN, O. Aikatutkimuksia pinopuutavaran teosta. **[Time studies on cordwood production.]** *Julk., Metsäteho, Helsinki* No. 7, 1947. pp. 40. [Fi.]

417. MAKKONEN, O. Leimikon tiheyden vaikutus pinopuutavaran tekoon. **[Influence**

of the density of stands marked for felling on the making of cordwood.] *Julk., Metsäteho, Helsinki* No. 9, 1948. pp. 37. 10 refs. [Fi.e.]

Results of a survey on different operations in dense and sparse stands, suggest that if the density of the stands varies within reasonable limits, it has little effect on the working time.

418. Makkonen, O. Aikatutkimuksia tukkien ja paperipuiden teosta talvella. [**Time studies on the making of logs and pulpwood in winter.**] *Julk., Metsäteho, Helsinki* No. 18, 1949. pp. 124. 18 refs. [Fi.e.]

Gives in numerous graphs and tables (with captions in English), the results of time studies on the felling and initial conversion of barked and unbarked Pine and Spruce logs and of unbarked Pine and Spruce pulpwood.

419. Tuovinen, A. Aikatutkimuksia paperipuiden varastokuorinnasta ja -katkonnasta. [**Time studies of the barking and cross-cutting of pulpwood at log dumps and other storage sites.**] *Julk., Metsäteho, Helsinki* No. 8, 1948. pp. 39. 12 refs. [Fi.e.]

Detailed studies, supported by tables and graphs, of Pine and Spruce, cut in winter and barked in spring (both by hand), for bolts of 1, 2 and 4 m.

420. Tuovinen, A. Tutkimuksia paperipuiden hankinnasta pohjois-suomessa. I. Kuorimishukka ja kuutiosuhteet. II. Veteen vieritys. III. Eri pituisten kuorellisten paperipuiden ajo. [**Investigations of pulpwood logging in North Finland. I: Barking waste and volume ratios. II: Rolling into water. III: Horse sledge hauling of unbarked pulpwood of different lengths.**] *Julk., Metsäteho, Helsinki* Nos. 11*a*, *b*, 12, 1948. pp. 38 + 17 + 30. 29 refs. [Fi.e.]

Presents with numerous graphs and tables the results of investigations on barking-waste of 2-metre pulpwood and determination of the solid volume of 4- and 6-m. pulpwood, and of time studies on rolling sawlogs and pulpwood stored by the side of the waterway into the water, and on the hauling of pulpwood.

421. Bromley, W. S. **Pulpwood peeling in Canada.** *Woodl. Sect. Index Canad. Pulp Pap. Ass.* No. 1066 (*B*–7–*d*), 1950. pp. 16. 12 refs.

A review of the literature from 1933, with particular reference to chemical means of facilitating barking.

422. Johnson, G. M. **Log barker having water-jets oscillatable about longitudinal log axis.** *U.S. Patent* No. 2,501,848, March 28, 1950. *Abstr.* in *Paper Tr. J.* 130 (15), 1950 (42). P.R.

32.29. Clearance of Felling Site. Stump Removal. Slash Disposal

See also *For. Abstr.* 12 (No. 251).

423. **Machine mows trees.** *Amer. Nurserym.* 91 (5), 1950 (40).

By passing once over a densely wooded area, a new tree-mowing machine, the Bushwacker, which is being produced by the American Steel Dredge Co., Inc., Fort Wayne, Ind., will reduce all trees up to 8 in. in diameter and all undergrowth to small fragments and deposit the material upon the ground without disturbing the topsoil. The Bushwacker is mounted on a crawler-tractor unit and powered by a 168-h.p. diesel engine, weighs 14 tons, is 10 ft. wide, 21½ ft. long, and clears a swath 6 ft. wide at about 1½ m.p.h. Regrowth is retarded, since the trunk fibres are broken off at the root junctures. The shredded residue serves as a mulch and eventually decays, adding humus to the soil. The Bushwacker has cleared practically all types of growth, including Oak, Maple, Hickory, Pine, Willow, Palmetto, Honeysuckle etc.

424. Fobes, E. W. **Status of portable wood chippers.** *Prepr. U.S. For. Prod. Res. Soc.* 67, 1949. pp. 8. [U.S. Forest Products Research Laboratory, Madison.] P.R.

Portable chippers in limited use are described, and their utility discussed. They have been found valuable for brush disposal, for disposal of orchard thinnings (the chips are then used for improving sandy soils), and in sawmills and railways sidings for production of chips from slabs, edgings and round wood, for manufacture into crude fibre products. A tabulated summary is given showing uses and specifications for chips and hogged wood, and production costs are discussed. Chippers capable of handling larger wood, and barking equipment for use in conjunction with the chippers, are needed.

425. KOROLEFF, A. **Portable chippers—some additional data.** *Woodl. Res. Index Pulp Pap. Res. Inst. Can.* No. 79 (*B*–11), 1950. pp. 3.

[Cf. *For. Abstr.* 11 (No. 1933).] Describes the portable (heavy type) wood chipper of the National Container Corporation (Tomahawk, Wis., U.S.A.).

426. STOVER, W. S. **The stumpwood supply in South Mississippi.** *Naval Stores Rev.* 59 (48), 1950 (14–5, 24–5).

Of the total U.S. supply of rosin and turpentine respectively 17% and 10% are produced in Mississippi from resinous stumps and other logging waste. The second forest survey of Mississippi, recently completed by the Southern Forest Experiment Station, revealed that the total remaining supply is about 6½ million tons, roughly enough for 10–15 years more at the present rate of exploitation.

32.8. *Grading and Storage of Wood in the Rough*

See also *For. Abstr.* 12 (Nos. 758–9).

427. [FINDLAY, W. P. K.] **Decay in felled timber.** *Timb. Tr. J.* 190 (3809), 1949 (1558–9).

Part of a paper read to the British Association at Newcastle-on-Tyne. It deals with some problems of waste in timber due to decay. 'Dote' (incipient decay) particularly in Beech, is frequently caused by felling timber in winter and allowing it to lie in the forest throughout the summer. Speedy conversion or proper piling in the timber yard is the best preventive. Great skill is needed to judge whether decay is advanced enough to render the timber unfit for its original purpose, and waste may also result from inspectors' 'playing for safety'.

428. [FINDLAY, W. P. K.] **Deterioration in logs.** *Timb. Tr. J.* 190 (3810), 1949 (1719–20).

Part of a paper read to the British Association at Newcastle-on-Tyne. Recommendations are made for the preservative treatment of logs and sawn timber, both at home and in tropical conditions.

429. YOUNG, H. E. **Bluestain in Hoop Pine logs.** *Queensland Journal of Agricultural Science, Brisbane* 5 (3), 1948 (125–40). H.S.B.

Experiments were made with Lignasan (an ethyl mercury solution), Bordeaux mixture, a creosote/soap emulsion, and a mixture of Quartzite (a meta-silicate of Na) with As_2O_3, sprayed on the logs immediately after felling and barking. The tabulated results show that Lignasan gave better protection than the other chemicals and that logs treated with Quartzite/arsenic mixture were as badly attacked by blue stain as controls. Logs left in the rain forest unbarked and with their ends sealed with a mixture of creosote and petroleum jelly were free from attack; this treatment is excellent for selected trees which are cut for seed before the area as a whole is felled and which cannot be removed for a considerable time, but is unsuitable for general use because the bark tightens on a tree a few weeks after felling and is difficult to remove. Further experiments showed that Lignasan remained active on 74 logs for at least 4 weeks and that there is no advantage in spraying again a few weeks after the first treatment; logs treated later than 24 hr. after barking became seriously stained. None of the chemicals prevented borer attack; but unbarked logs were not attacked.

32.9. *Transport*

See also *For. Abstr.* 12 (No. 420).

430. MCCOLL, B. J. **Recent developments in mechanical logging.** *Pulp Paper Mag. Can.* 51 (5), 1950 (128, 130–1, 134, 136, 138). *Woodl. Sect. Index Canad. Pulp Pap. Ass.* No. 1076 (*B*–1).

Cable yarders, hauling equipment, loaders and unloaders.

32.91. Land Transport

431. **Mechanical hauling operation survey.** Woodlands Section, Canadian Pulp & Paper Association, Montreal. 1949. pp. 2 + 1 gph., 1 tbl.

A survey of methods of loading and unloading, equipment, distances hauled etc. for transport of pulpwood in Eastern Canada.

432. MARTIN, P.-H. Maximes et observations sur le transport du bois. **[Notes on timber transport.]** *Rev. Bois Appl.* 5 (6), 1950 (13–8). [F.]

Describes with illustrations motor vehicles used in timber transport and methods of loading and unloading them.

433. HEISKANEN, V. Tutkimuksia pinotavaran autokuljetuksesta. **[Investigations on the hauling of stacked wood by lorry.]** *Julk., Metsäteho, Helsinki* No. 10, 1948. pp. 66. 74 refs. [Fi.e.]

An investigation was made into truck hauling on permanent roads, covering: (1) the effect of the quality of the road on speed, truck maintenance, and haulage costs; and (2) time and labour used in loading and unloading. Results are shown in graphs and tables, with English captions. Recommendations are made on types of equipment and the best use of labour.

434. POPE, C. L. **Another look at truck selection. A detailed analysis of factors which enter into the selection of logging trucks to meet the particular need of operators.** *Lumberm.* 77 (4), 1950 (50–1, 95).

435. BLINK, G. C. V.D. Afvoerkosten per truck in de houtvesterij Purwakarta. **[Cost of truck hauling in the Forest District of Purwakarta [Java].**—With a comment by E. H. P. Juta.] *Tectona* 39 (3), 1950 (224–36). [Du.e.]

436. FOBES, E. W. **Increased traction for wheeled tractors.** *Rep. U.S. For. Prod. Lab., Madison* No. *R*1637–37, 1950. p.l. P.R.

A standard wheel-type tractor equipped with detachable crawler tracks has proved suitable for pulling pulpwood sleighs in winter and for use on soft ground. Special brackets attached to the rear axle support front idler wheels between the front and rear tractor wheels. An endless snowmobile type of track passes round the idler and rear driving wheels without interfering with the steering.

437. LEDOUX. Le tracteur routier à deux essieux moteurs. **[A road-haulage tractor with two [rear] driving axles.]** *Bois For. Trop.* No. 13, 1950 (36–8). [F.e.span.]

Enumerates the features required in a tractor for use in transporting timber in tropical forests with rudimentary logging roads. These include a powerful diesel engine, two rear driving axles with beam suspension to counteract the unevenness of the ground, and a wide range of gear reduction. A type of Renault vehicle (illustrated) actually in service in Gabon seems to fulfil these conditions. This is an 8-litre diesel lorry with double Thornton deck; over-all length 5·59 m.; over-all width 2·25 m.; total maximum load 11,000 kg.; total weight per linear m. between the two exterior axles, 4·130 kg.; maximum load of most heavily loaded axle, 6·040 kg. The possible speeds range from 2·7 to 40 km., and in reverse from 2·2 to 5·6 km.p.h.

32.92-4. Water Transport

See also *For. Abstr.* 12 (Nos. 420, 441).

438. KIVELÄ, A. **Floating, the most important way of transporting timber in Finland.** *Metsät. Aikak.* 1949 (6/7), (201–5). [E.f.]

32.95. Ropeways. Cableways

See also *For. Abstr.* 12 (No. 430).

439. KOROLEFF, A. **Wood transport by gravity over a suspended wire.** *Woodl. Res. Index Pulp Pap. Res. Inst. Can.* No. 81 (*B*–8–*g*), 1950. pp. 14.

The author summarizes the progress reported in previous articles [cf. *For. Abstr.* 11 (No. 1179)], and then gives an account of more recent improvements. In particular he gives a detailed description (illustrated by photographs and diagrams) of the 'by-pass' device invented and patented by E. O. Ehrhart of the Armstrong Forest Company, Johnsonburg, Pa. This provides an ingenious and practical intermediate support for suspended wire, which should permit gravity transport of wood on a multiple-span basis and therefore over much greater distances than those hitherto considered. It also makes possible a change of direction, as well as a change in gradient, as the topography or other considerations may require. The device may be suspended from a tree, from a wire or chain stretched between two trees, or from a pole tripod, if no trees are available.

It appears from trial of a pilot model that the change in the gradient of the wire by the use of this device should not be too great for smooth operation, probably under 30%, and much the same applies to turning the course of the wire to right or left. For greater changes in gradient or direction, two or more supports may be used at shorter intervals. It is hoped that the Canadian Ingersoll-Rand Co. will soon begin to produce the by-pass device.

Various types of steel wire and steel splice, winches and load attachments are described

and evaluated, and in an appendix are brief descriptions of Norwegian 'Pendulum' systems, a method of 'tight-line yarding' used in Quebec, and a cableway used in the Ticino. [Cf. *For. Abstr.* 9 (No. 1631); 11 (No. 1950).]

32.96. Loading and Unloading

See also *For. Abstr.* 12 (Nos. 431–2).

440. FOBES, E. W. **Inexpensive crane-type loader.** *Rep. U.S. For. Prod. Lab., Madison* No. *R*1637–38, 1949. pp. 1. P.R.

A crane loader which can be driven by tractor, jeep or lorry, and is suitable for small timber operators or woodland owners, is described. The capacity of the crane is equal to the weight of the unit to which it is attached, up to a maximum of 6,000 lb. Power is derived from the motor of the tractor or lorry through a power take-off spline coupled to a winch built in the frame of the crane. The crane can be attached to the hauling machine in a few minutes. No alterations to the power unit making it unsuitable for other uses are necessary, and the crane can be used for skidding logs, loading machinery, and other farm operations.

441. COLLIER, R. D. **Loading pulpwood out of water with crane and basket.** *Pulp Paper Mag. Can.* 51 (2), 1950 (65–6). (*Woodl. Res. Index Pulp Pap. Res. Inst. Can.* No. 6 (*B*–7–*b*), 1949.)

The basket, designed and developed by the Canadian International Paper Co., is made with 4-in. steel tubing. It measures $13 \times 12 \times 4\frac{2}{3}$ ft. and is swung out over the floating pulpwood by a revolving crane. The tilt of the basket is controlled by a rear cable, so that, on hitting the water, it immediately sinks down under the wood. The crane continues to revolve, dragging the basket through the pulpwood. When full, the basket is levelled, the boom is brought back over it, and it is hoisted out of the water. The crane alternates between two scows, loading one while the wood on the other is being tiered. Four scows, each having a capacity of 170 cords, are loaded during a 10-hr. day.

33. CONVERSION AND PRESERVATION OF WOOD

442. COHEN, W. E. **Integrated wood-using industries in Australia and New Zealand.** [*Proceedings of the*] *Fourth Meeting of the* [*F.A.O.*] *Technical Committee on Wood Chemistry, Brussels* 1949 (2, 18–23 + 1 dgm.). P.R.

Three projects, one in New Zealand based on plantation-grown *Pinus radiata*, one in Tasmania on prime *Eucalyptus* forests and one in Western Australia on *Eucalyptus* from low-grade forest occupying land that is being cleared for pasture or reforestation, are described. Two of the projects integrate sawmilling and pulping and the third sawmilling and wood distillation.

33.1. *Mechanical Conversion excluding the Manufacture of Mechanical Pulp*

See also *For. Abstr.* 12 (No. 12).

443. THORNTON-JONES, G. **Portable power tools and equipment.** Crosby Lockwood & Son Ltd., 39 Thurloe Street, S.W.7. 1949. pp. 187 + 2 tbls. Price 15*s*. P.R.

Describes the construction, use and maintenance of power tools including saws, planers, sanders and other woodworking tools, and includes a table showing the manufacturers in Great Britain of the tools described.

444. **Woodworking machinery at the B.I.F.** *Timber News* 58 (2131), 1950 (215–6, 218).

Describes interesting features (including saws, drills, and other woodworking tools) from 18 stands in the Birmingham section of the British Industries Fair, 1950.

445. **Light woodworking equipment.** *Wood* 15 (5), 1950 (178–81).

446. AREND, A. G. **Physical characteristics in machining wood.** *Woodwkg. Ind.* 7 (3), 1950 (161–2). P.R.

Discusses modifications in machining methods and tools needed for woods having different physical characteristics.

447. **Accidents and their prevention.** *Timber News* 58 (2130), 1950 (172–3).

Descriptions of accidents with woodworking machinery, from *Accidents—how they happen and how to prevent them*, published by the Ministry of Labour and National Service.

Use of Wastes

See also *For. Abstr.* 12
(Nos. 291, 450, 483, 497, 503, 538–49, 602).

448. VORREITER, L. Festgehalte und Schichtgewichte von Spreisseln und Schwarten. **[Solid content and piled weight of edgings and slabs.]** *Mitt. öst. Ges. Holzforsch.* 2 (1), 1950 (9–14). [G.] P.R.

Measurements were made on Spruce edgings and slabs, sorted by type (winter or summer felled, with or without bark) and size, and piled by different methods. For edgings, the solid content was found to increase with the proportion of edgings of regular cross-section. The relations between closeness of piling, type of assortment, moisture content and the solid content are shown in tables and graphically.

449. VORREITER, L. Die Sägespäne und ihre Verwertung. **[Sawdust and its use.]** *Repr.* from *Allgemeine Holzrundschau, Wien* Feb., 1950. pp. 10. 45 refs. [G.] P.R.

33.12. Joinery, Furniture and Cabinet Making, Wood Bending

See also *For. Abstr.* 12 (Nos. 336, 603).

450. HYLER, J. E. **Woodworking plant blower systems.** *Sth. Lumberm.* 179 (2248–9), 1949 (33–4; 288–90); 180 (2251–2; 2254), 1950 (46, 48, 50; 55–6; 34–5).

451. HAYCOCK, A. H. **Principles of machine woodworking.** *Wood* 15 (3–5), 1950 (100–3; 135–8; 172–5).

Instalments dealing with: four-cutter design (5); the quality of machined surfaces; and cutter setting technique.

452. PERRY, T. D. **Standardization in cutting tools.** *Wood Prod.* 55 (5), 1950 (29–33).

Results of a survey by the Wood Industries Division of the American Society of Mechanical Engineers on the relationship of the size of an arbor hole to the diameter of a circular saw, illustrate the need for standardization in woodworking machinery.

453. HORDERN, R. H. **The economics of woodworking: 2, 3—Moulding machines.** *Wood* 15 (4–5), 1950 (124–6; 169–71).

[Cf. *For. Abstr.* 12 (No. 491).]

454. MICHAUD, J. De l'utilisation rationelle d'une machine à bois au point de vue usinage et puissance absorbée. **[The best use of a woodworking machine from the point of view of machining and power consumption.]** *Rev. Bois Appl.* 5 (5), 1950 (13–6).

Gives examples of calculating the best arrangement and angle of cutters and the most economical speeds for cutting a given profile on the moulding machine.

455. HYLER, J. E. **Single spindle vertical spindle boring work.** *Wood-Worker, Indianap.* 69 (3), 1950 (32, 34). P.R.

456. HYLER, J. E. **Clamping operations in woodworking.** *Sth. Lumberm.* 179 (2249), 1949 (316, 318, 320).

457. STEVENS, W. C., and TURNER, N. **A method of improving the steam bending properties of certain timbers.** *Wood* 15 (3), 1950 (79–84). [Forest Products Research Laboratory, Princes Risborough.]

The bending properties of some timbers (including some tropical hardwoods) were markedly improved by gluing a thin lamina of wood possessing good bending properties to the concave face. Normal steam-bending methods were then used on the composite piece. The lack of data on the behaviour of the combined woods makes preliminary tests necessary for calculating the exact thicknesses. Good results were obtained with *Entandrophragma utile* supported by Beech, and the limiting radius of *E. utile* was reduced by 50% through the addition of the Beech. Sawn and planed material proved more satisfactory for the supporting layer than rotary-cut or sliced veneer. Gluing and assembling processes were the same as those used in flat assemblies. Both phenolic and resorcinol resins gave good results. Commercial possibilities have yet to be investigated. Production costs are higher than for solid bending.

458. HOLLINGER, E. R. **The finishing of Philippine Mahoganys.** *Wood Prod.* 55 (5), 1950 (26–8, 34).

459. SALOMON, R. La fabrication du meuble. **[Furniture manufacture.]** *Rev. Bois Appl.* 5 (4), 1950 (18–21). [F.]

Discusses briefly the processes and equipment used in air and kiln seasoning, manufacture and assembly of solid and laminated wooden furniture.

460. GRAHAM, P. H. **Solid wood chair seat production methods.** *Wood-Worker, Indianap.* 69 (1), 1950 (36, 38). P.R.

33.14. Match Manufacture

461. GRIFFIOEN, K. Lucifersfabricage in Indonesie. **[Match manufacture in Indonesia.]** *Rapp. Bosbouwproefsta., Buitenzorg* No. 30, 1950. pp. 11. [Du.du.jav.e.]

Previous attempts to establish a match industry in Indonesia have failed largely because costs were high and the products inferior to those imported. Tests made at a Swiss factory, by a Swedish company in Bangkok and by the Indonesian Forest Research Institute, indicate that some 20 species of Indonesian timbers might be used for splints and boxes if lower quality requirements were accepted than in Swedish factories. Many of the species are ruled out because of scarcity or high costs of extraction, and others are less suitable because of poor colour, coarse texture or low durability. Factories might be established on Java for exploitation of Jeungjing (*Albizzia falcata*) or on Borneo or Sumatra for Terangtang (*Campnosperma* sp.), Mahang (*Macaranga* sp.) and Pulai (*Alstonia* sp.). Quick growing species which might be planted for future use are:—Jeungjing, Kelampejan (*Anthocephalus cadamba*), Mahang, Ganitri (*Elaeocarpus ganitrus*) and Kemiri (*Aleurites moluccana*).

33.15. Manufacture and Use of Veneers and Laminated Wood. Improved Woods. Laminated Materials other than Wood. Glues and Gluing

33.15.1. *Manufacture of Veneers and Laminated Wood*

See also *For. Abstr.* 12 (Nos. 366, 472–80).

462. SAKS, E. V. **Plywood production compared. A study of both American and European methods of modern plywood production.** *Timber of Canada* 10 (8), 1950 (31–3, 61–2, 64, 66).

463. RINNE, V. J. Vaneriteollisuutemme teknikon näkökulmasta. **[The Finnish plywood industry from the technical point of view.]** *Pap. ja Puu* 32*B* (4*a*), 1950 (11–4). [Fi.e.] P.R.

464. FLEISCHER, H. O. **Experiments in rotary veneer cutting.** *Prepr. U.S. For. Prod. Res. Soc.* 66, 1949. pp. 17. 5 refs. [U.S. Forest Products Laboratory, Madison.] P.R.

The results of experiments on the effect of knife angle and nose-bar adjustment on the quality of veneer are given in graphs. For $\frac{1}{8}$-in. veneer of Birch and many other species a knife angle of $90° \pm 30'$ gave satisfactory results; smaller knife angles gave a wavy veneer, varying in thickness, and larger angles a corrugated veneer. The angle necessary to give good veneer increased with decreasing thickness of the veneer to be cut. With thin veneer ($\frac{1}{64}$- or $\frac{1}{100}$-in.), knife angles had to be increased for Yellow Birch but not for Yellow Poplar; there may be a relationship between the knife angle and the density of the species. In some cases, especially with logs of large diameter and during the cutting of thin veneers, it was necessary to decrease the knife angle as the log diameter decreased with cutting. Reduction of the horizontal opening between the tip of the nose-bar and that of the knife reduced the severity of lathe checks and the roughness of the veneer. Overcompression, however, was found to reduce the thickness of the veneer beyond the point of recovery, and, in extreme cases, to cause separation between early- and late-wood of some softwoods.

465. HYLER, J. E. **Veneer clippers.** *Sth. Lumberm.* 179 (2240; 2244), 1949 (51–2; 55–6, 58).

33.15.2. *Use and Properties of Plywood and other Laminated Wood*

See also *For. Abstr.* 12 (Nos. 370, 459, 604–7, 617–9).

466. FREAS, A. D. **Studies of the strength of glued lamination wood construction.** *Rep. U.S. For. Prod. Lab., Madison* No. *R*1749, 1949. pp. 7. P.R.

The historical development of glued laminated constructions, their advantages and disadvantages, and the programme of research at Madison are discussed. Butt joints for end-to-end joining are unsatisfactory in members subject to tension stresses. Scarf joints, if carefully prepared, well glued and of a sufficiently flat slope, may have a large proportion of the strength of an uncut piece; tests of individual members show considerable variation in strength. Tests of members containing scarf joints in adjacent laminations show that the joints should be separated, but have not provided a firm basis for establishing spacing rules. Data for other types of end joints, some of which are already in use, are inadequate for determining allowable stresses. Results of tests on curved members containing different proportions of defective and clear material show that about 60% of defective material in the central portion of a laminated arch would not seriously reduce its strength.

33.15.4. *Laminated Materials other than Wood*

See also *For. Abstr.* 12 (No. 372).

467. KUENZI, E. W. **Effect of elevated temperatures on the strengths of small specimens of sandwich construction of the aircraft type: tests conducted immediately after the test temperature was reached.** *Rep. U.S. For. Prod. Lab., Madison* No. 1804, 1949. pp. 8 + 5 photos, 14 gphs., 2 tbls. P.R.

Describes tests on 21 sandwich constructions, including 4 with cores of end-grain Balsa, at temperatures up to 600° F.

468. HEEBINK, B. G., and MOHAUPT, A. A. **Effect of defects on strength of aircraft-type sandwich panels.** *Rep. U.S. For. Prod. Lab., Madison* No. 1809, 1949. pp. 12 + 2 dgms., 3 tbls. P.R.

469. NORRIS, C. B., ERICKSEN, W. S., MARCH, H. W., SMITH, C. B., and BOLLER, K. H. **Wrinkling of the facings of sandwich constructions subjected to edgewise compression.** *Rep. U.S. For. Prod. Lab., Madison* No. 1810, 1949. pp. 68 + 5 photos, 12 dgms., 22 gphs., 10 tbls. P.R.

The report is divided into 3 sections (1) mathematical analysis; (2) the data from a series of tests and a comparison of the theory with test results; and (3) suggested design criteria.

470. CHRISTIAN, M. B. **New faces for panels.** *Wood, Chicago* 5 (4), 1950 (22, 32). P.R.

Craveneer is a 3-ply panel with a wood veneer core, $\frac{1}{16}$, $\frac{1}{10}$ or $\frac{1}{8}$ in. thick, and faces of kraft paper, produced by the Chicago Mill and Lumber Company. The paper is glued to green veneer by a special adhesive which allows rapid drying of the core through the paper faces without causing blisters or delamination. The panels shrink with drying only about $1\frac{1}{2}$% as against *ca.* 10% average for rotary-cut veneer. Practically no drying defects appear, and Mississippi-delta Oaks, which are unsuitable for ordinary plywood manufacture because of the checking, honeycombing and other defects that develop during drying, can be used for the new process.

33.15.5. *Glues and Gluing*

See also *For. Abstr.* 12 (Nos. 366–8, 370, 594).

471. NOZU, R., GOTŌ, R., and KŌZAI, Y. **Studies on wood adhesives. I. The use of acetone-formalin resin as an adhesive.** *Wood Res., Kyoto* No. 4, 1950 (50–65). 6 refs. [Jap.e.]

The preparation and properties of an adhesive formed by the mixture of 1 mol acetone and 2·5 mol formalin with 30% NaOH solution as a hardener are described, and conditions of gluing (specific pressure, pressing time and temperature, glue spread and assembly time) are given. The resin was found to have a moderate water resistance, with an optimum specific pressure of 18 kg./sq. cm. for maximum water resistance. The wet adhesive strength is *ca.* 30 kg./sq. cm. and tends to increase with the air-drying time.

472. SELBO, M. L. **Durability of wood-working glues for dwellings.** *Prepr. U.S. For. Prod. Res. Soc.* 79, 1949. pp. 20. 11 refs. [U.S. Forest Products Laboratory, Madison.] P.R.

The results of extensive tests made at Madison on casein and synthetic resin glues are summarized and the suitability of these glues for use in house construction is evaluated. Results of controlled exposure tests on Birch plywood shear specimens, on joints between plywood and framing members, and on laminated beams, and of weathering tests on plywood

panels, are given in graphs and tables. Phenol, melamine and resorcinol glues are shown to be generally more durable than casein and urea glues in severe exposure conditions. Casein glues in particular deteriorate when exposed to moisture, and the urea glues are particularly affected by high temperatures and combinations of high temperature and high humidity.

473. NICHOLS, W. **A novel gluing process.** *Timber News* 58 (2130), 1950 (169–70).

Describes the Gallay gluing process, a method using direct electrical heating of the glue line, which contains a conducting textile mesh incorporating acetylene black, as a resistor.

474. SORSA, B. Lämmön jakautumisesta radiokuumennetussa liimasaumassa. [**The temperature distribution in a radio-frequency-heated glue line.**] *Tiedoitus, Valtion teknillinen Tutkimuslaitos* No. 87, 1950. pp. 22. 2 refs. [Fi.e.] P.R.

The temperatures in a H.F.-heated glue line were measured after the heating cycle. In parallel heating, the temperature is highest near the hot electrode and lowest in the centre of the test piece. Near the cold electrode the temperature is a little higher than in the centre. In perpendicular heating, the variations of temperature are smaller. Results are given in graphs with English legends.

475. CUNNINGHAM, J. B. **Radio-frequency tooling in America [in the manufacture of bent-plywood furniture and in edge banding].** *Timber News* 58 (2131), 1950 (212–9). *Repr.* from *Furniture Manufacturer, New York.*

476. HYLER, J. E. **Veneer jointing technique.** *Veneers & Plyw.* 44 (2–4), 1950 (30–1; 18–9; 18–9). P.R.

477. SCALES, G. M. **The edge-to-edge splicing of veneers.** *Bull. Aero-Res., Duxford* No. 87, 1950. pp. 6. P.R.

478. SCALES, G. M. **The edge-to-edge splicing of veneers. 2. Working problems.** *Wood* 15 (3), 1950 (93–5).

479. PENTZ, P. G. **Trends in plywood gluing.** *Timber News* 58 (2131; 2132), 1950 (195–6, 200; 244–6).

480. PERRY, T. D. **Follow up pressure in gluing.** *Wood Prod.* 55 (4), 1950 (29–32, 35–6).

33.16. Wood Flour

481. WECKMAN, M. B. La fabrication de la farine de bois en Finlande. [**The manufacture of wood-flour in Finland.**] *Rev. int. Bois* 17 (152), 1950 (27, 36). [F.]

33.17. Sawmilling and Machine Planing

See also *For. Abstr.* 12 (No. 442).

482. MCINTOSH, W. G., and CHURCH, J. W. **Preliminary report on small sawmilling equipment. A compendium of small sawmills.** Research Council of Ontario, Toronto. 1949. pp. 55. P.R.

Presents data sheets for some 55 portable and semi-portable sawmills used in Canada and manufactured in Canada or the U.S.A. Information given includes the manufacturer and Canadian agent, dimensions and type of saw, feed, power requirements, production capacity and price.

483. SMITH, D. S. **A survey of sawmill machinery and operations—Part II*A*. A progress report.** *Technical Bulletin, British Columbia Research Council, Vancouver* No. 15, 1949. pp. 17. P.R.

[Cf. *For. Abstr.* 11 (No. 1245).] Includes sections on planning, improvement in dollar value of converted timber, use of waste, improvement of equipment, and efficient use of labour.

484. SMITH, D. S. **A survey of sawmill machinery and operations. Part II*B*. Improvement of sawmill equipment. A progress report.** *Technical Bulletin, British Columbia Research Council, Vancouver* No. 17, 1950. pp. 23. P.R.

485. CARPENTER, R. D. **Something new in sawmills.** *Sth. Lumberm.* 179 (2249), 1949 (195–9).

Describes a circular sawmill evolved by a machinery company in Corinth, Miss., in which hydraulic pressure is used to drive all moving parts. The pressures are supplied by a small pressure pump, taking its power from a diesel engine. All controls are operated by the

sawyer. The mill is marketed under the trade name 'Hydramagic Sawmill'.

486. TURNBULL, R. F., and COLWELL, S. J. **Log cross-cut saws.** *For. Prod. News Lett. C.S.I.R.O. Aust.* No. 178, 1949 (4).

Describes briefly, with illustrations, drag saws, chain saws, mobile circular saws and circular log-docking saws recommended for use in Australia.

487. DOSKER, C. D. **The 'cut control' safety saw.** *Sth. Lumberm.* 180 (2253), 1950 (36).

The saw, which was brought to the U.S.A. from Germany by the Precision Tool and Instrument Company of New York, is a carbide-tipped rip saw, designed primarily for safety. The rim is a perfect circle, each tooth projecting above the rim with a definite clearance of $\frac{1}{32}$ in. This permits the removal of only this amount of kerf by each tooth. The timber has to be fed to the saw at a rate equal to the amount of kerf removed × number of teeth × saw speed. One of the most interesting features of the saw is the reduced amount of power required to operate it.

488. TELFORD, C. J. **Energy requirements for insert-point circular headsaws.** *Prepr. U.S. For. Prod. Res. Soc.* 49, 1949. pp. 14. 6 refs. [U.S. Forest Products Laboratory, Madison.] P.R.

Forces used in sawing with an insert-point circular headsaw were measured. The effects of feed rate, cutting depth, density of the wood, and saw speed are summarized in tables. Other factors discussed are tooth width, hook angle, frozen wood, reverse-direction cutting, saw diameter, gullet space and number of teeth. [Cf. *For. Abstr.* 11 (No. 1244).]

489. DUNSMORE, F. L. **Technique of woodworking machinery. (2) Circular saws. I–V.** *Ill. Carp. Build.* 139 (3786; 3788; 3790; 3792; 3794), 1950 (444, 446; 538, 540; 614, 616, 618; 696; 776, 778). P.R.

(I) Describes briefly the rip saw, dimension saw, different types of cross-cut saws, and the straight-line edger.

(II) Discusses the uses and maintenance of the plate saw, the taper or splitting saw, the ground-off saw, the swage saw, the hollow-ground saw, and the drunken, plough or wobble saw.

(III) Essentials for good performance are: true running of saw spindle and collars; good quality steel; running at the correct speed; correct packing; the use of saws with tooth spacing suited to the job; and careful sharpening and setting.

(IV) and (V). Deal with sharpening, sharpening machines, and saw setting by different methods—spring, hammer, machine and swage setting.

491. HORDERN, R. H. **The economics of woodworking. 1. Bandsaws and circular saws.** *Wood* 15 (3), 1950 (85–7).

[Cf. *For. Abstr.* 12 (No. 453).]

492. STARČEVIĆ, J. Tehničko normiranje tračne pile. [**Technical normalization of band-saw working,**] *Šum. List* 73 (6/7), 1949 (232–9). [Croat.russ.e.]

A method is described of computing the normal output of bandsaws, for different diameters of logs and sawn sizes.

493. CHAMBERLAND, H. J. **New principles indicate reduced band saw costs.** *Wooden Box & Crate, Washington, D.C.* 11 (4), 1949 (21–5). P.A.T.R.A.

The Buttress hardened-tooth band is in $\frac{1}{4}$-, $\frac{1}{2}$-, $\frac{3}{4}$- and 1-in. widths with 6, 4, 3 and 2 teeth per in. respectively. This type of saw, which will also cut carbon steels, is not affected when it hits a hidden nail or a bad mineral streak. Less heat is generated because fewer teeth come in contact with the work in a given time and chips cannot become wedged in the gullets. Examples are given of the use of the different saw widths at 3 plants. A table is given showing recommended saw pitch and speed for different thicknesses of 15 hardwood and 6 softwood species, 13 building boards and 4 plywoods.

494. WALKER-TURNER CO., INC., NEW YORK. **Saw guard.** *Brit. Patent* No. 605,210, July 19, 1948. Price 2*s*. *Abstr.* in *Timber News* 58 (2129), 1950 (131).

Describes with illustrations a saw guard which will protect the operator during sawing, as well as covering the saw while not in use.

495. HYLER, J. E. **Trimmers and their operation.** *Sth. Lumberm.* 180 (2259), 1950 (54, 56).

496. DOUGLAS, W. **The panel planer.** *Woodwkg. Ind.* 7 (4; 5; 6), 1950 (224–6, 236; 289–91; 355–6). P.R.

497. **Pond sawdust eliminators.** *Timberman* 81 (4), 1950 (54, 56).

Describes dredges, mounted on barges, used to remove sawdust that falls into the log pond during preliminary sawing.

498. **New system cuts cost of loading flat cars.** *Lumberm.* 77 (4), 1950 (76, 110).

Lumber is loaded on railway trucks with the aid of 2 carriages having small ball-bearing wheels (*ca.* 2 in. diameter) and used in conjunction with 2 steel riding strips. The device, which is used by the Oregon Canes Lumber Co., is claimed to shorten loading time by 4–6 hours per railway truck.

499. RONKANEN, A. J. Tutkimuksia sahatukin pituuden, lenkouden ja kapenemisen vaikutuksesta sydäntavaran pituuteen ja leveyteen. **[Investigations into the effect of length, crooked growth, and taper of sawlogs on the length and width of the most valuable lumber.]** *Julk., Metsäteho, Helsinki* No. 23, 1950. pp. 34. 3 refs. [Fi.e.]

500. GREGORY, G. R., and PERSON, H. L. **Lumber values for East Texas Pine logs.** *Occ. Pap. Sth. For. Exp. Sta.* No. 113, 1949. pp. 31. 4 refs.

A study of Shortleaf and Loblolly Pine log values and milling costs was made to determine the effect of log diameter and quality on grade yields of converted timber, production costs and net returns, at small or medium-sized mills. Results are given in graphs and tables.

501. **Lumber grades and sizes from No. 3 West Coast Hemlock logs.** *Timberman* 51 (7), 1950 (112, 114–5).

Results of a sawmill recovery study.

33.3. *Chemical Treatment*

502. MO OCH DOMSJÖ AKTIEBOLAG. **Improvements in or relating to the treatment of cellulosic raw materials to facilitate separation of the cellulose from lignin and other constituents.** *Brit. Patent* No. 604,864, July 12, 1948. pp. 2. Price 2*s*. P.R.

The raw material (wood or other cellulosic raw material), preferably in finely divided form and in suspension in water or another liquid, is subjected to the action of ultrasonic mechanical vibrations having a frequency of above 10^4 per second. It has been found that this treatment splits up the bonds between the cellulose and the lignin so that the cellulose can be more easily separated and dissolved. An example of the treatment on an aqueous suspension of Pine wood powder is described; results are tabulated.

503. SUGIWARA, M. **Lignin resins. 1. Dipping sawdust in dilute sulfuric acid at normal temperature. 2. Sulfuric acid treatment of sawdust at high temperature. 3. Dilute alkali treatment of sawdust at high temperature under high pressure.** *Report, Osaka Municipal Institute of Industrial Research* No. 12, 1949 (18–32). *Chem. Abstr.* 44 (5), 1950 (2235–6). P.R.

Use of Wastes

See also *For. Abstr.* 12 (No. 377–84, 552–3, 602).

504. ENKVIST, T. and HÄGGLUND, E. Studien über den Zusammenhang zwischen Sulfidierung, Methylierung und Sulfitierung von Lignin. **[Studies on the relationship between sulphidation, methylation and sulphonation of lignin.]** *Svensk Papp Tidn.* 53 (4), 1950 (85–93). 28 refs. [G.e.sw.] P.R.

505. FRANKLIN, J. N., and GODDARD, H. O. **Medium pressure steam concentration of waste sulphite liquor.** *Pulp Paper Mag. Can.* 51 (3), 1950 (139–46).

A report of tests on a pilot plant for concentrating waste sulphite liquor by use of medium-pressure steam. The plant can evaporate 24,000 lb. of water per day, and the method should prove cheaper than those generally used.

506. ELGEE, H., CRAIG, D., and RUSSELL, J. K. **Thermal compression evaporation of waste sulphite liquor. A pilot plant study.** *Pulp Paper Mag. Can.* 51 (3), 1950 (178–89). 7 refs.

507. LASSENIUS, T. Statistiska data om sulfatbiprodukternas användning i Finland. **[Statistical data on the use of sulphate by-products in Finland.]** *Pap. ja Puu* 32*B* (4*a*), 1950 (22–30). [Sw.e.] P.R.

508. JAKOBSON, T. Tallöl oder flüssiges Harz: eine Literaturübersicht. [**Tall oil or liquid resin: a review of literature.**] *Svensk PappTidn.* 52 (15; 18; 19), 1949 (379–82; 451–3; 481–2). [G.] P.R.

Lists 128 references with brief indicative abstracts. [Cf. *For. Abstr.* 11 (No. 1269).]

509. JENSEN, W. **Chromatographic analysis of tall oil. III. Location of acidic matter in column.** *Pap. ja Puu* 32*B* (5), 1950 (142–4). 3 refs. [E.] P.R.

Cf. *For. Abstr.* 11 (No. 2031).

510. WALDEN, E. **Manufacturing of lubricating and emulsifying oils from tall oil.** *Pap. ja Puu* 32*B* (5), 1950 (140–1). [E.] P.R.

511. JOHANSON, S. **Tall oil resin acids and their use for paper sizing.** *Svensk PappTidn.* 53 (10), 1950 (258–65). 34 refs. [E.sw.g.] [Mo och Domsjö AB, Örnsköldsvik, Sweden.] P.R.

33.32. Pulp and Paper Manufacture. Wallboards. Plastics

33.32.1. *Pulp Manufacture*

See also *For. Abstr.* 12 (Nos. 389, 422, 442, 502–11).

512. **Commodity reports—wood pulp.** *Unasylva* 4 (2), 1950 (69–77).

World production and consumption in 1949.

513. MCEWEN, J. M. **Procurement of West Coast pulpwoods [: a survey of species used, logging methods and the increased use of thinnings and waste].** *Tappi* 32 (12), 1949 (544–6). 2 refs. L.S.

514. LECACHEUX, P., and PETERI, R. **The utilization of tropical forests for the production of paper pulp.** [*Proceedings of the*] *Fourth Meeting of the* [*F.A.O.*] *Technical Committee on Wood Chemistry, Brussels* 1949 (6–7, 56–8). P.R.

Laboratory pulping tests on tropical species, mixed in proportions corresponding to the natural composition of the forest areas, were made at the Régie Industrielle de la Cellulose Coloniale in Paris, and gave good results. An industrial test on 150 tons of wood representing the average composition of an Ivory Coast forest area, confirmed the laboratory tests. Papers made included kraft, thin papers, writing and printing papers and blotting paper. Resistance properties of the unbleached papers were satisfactory and comparable to those of papers used in France.

515. RYS, L. **Tropical woods for the cellulose industry.** [*Proceedings of the*] *Fourth Meeting of the* [*F.A.O.*] *Technical Committee on Wood Chemistry, Brussels* 1949 (9, 120–3). P.R.

Parana Pine (*Araucaria angustifolia*) can be successfully cooked by all the usual processes, and gives pulps of fairly good bleachability. The trees can be used within 15 years. They show large differences in density in the upper and lower, inner and outer parts of the tree. Figures are given for properties of chemical and mechanical pulps. Research is in progress on the suitability of Brazilian hardwood species for pulp.

516. TORTORELLI, L. A. **The possibilities of Argentina's sub-tropical species for the pulp and paper industry.** [*Proceedings of the*] *Fourth Meeting of the* [*F.A.O.*] *Technical Committee on Wood Chemistry, Brussels* 1949 (8, 111–4). P.R.

517. BRAITHWAITE, J. D., and MANNING, D. E. B. **Information recorded by Forest Department, Burma on the Bamboo [*Melocanna bambusoides*] pulp possibilities of Arakan and Tavoy forest divisions.** Forest Department, Rangoon. 1948. pp. 25 + 2 maps. 4 refs.

518. CREAMER, G. B. **Wood decay.** *Pulp Paper Mag. Can.* 51 (4), 1950 (86–90). 17 refs.

A review of the action of decay fungi on the composition of wood, and the consequent effects on pulp quality, with some practical recommendations for avoiding decay in pulpwood.

519. BJÖRKMAN, E., SAMUELSON, O., RINGSTRÖM, E., BERGEK, T., and MALM, E. Om rötskador i granskog och deras betydelse vid framställning av kemisk pappersmassa och silkemassa. [**Decay injuries in Spruce forests and their importance in the production of paper and rayon pulps.**] *Skr. K. Skogshögsk. Stockh.* No. 4, 1949. pp. 73 + 2 photos. 22 refs. [Sw.e.] Price *Kr.*3.

Pulping tests for sulphite, sulphate and rayon pulps, were made on samples of wood in different stages (described as aniline wood, light firm rot, dark firm rot and loose rot) of decay by *Polyporus annosus*. Tests on the specific gravity of wood at different stages showed that sound wood had an average weight of 425·3, aniline wood 421·0, wood with light firm rot 369·6, with dark firm rot 321·4, and with loose rot 246·8 kg. dry substance/cu.m. fresh wood. At present very little decayed wood is accepted for the factories, rarely more than 10% of the total volume and in sulphite wood probably less than 1%. The experiments showed that aniline wood, in proportions which would be used in practice, has no harmful effect on pulp yield or quality. Wood with light firm rot contains rather less cellulose than sound wood and reduces the pulp yield, but not to any serious extent in the proportions in which it would be used. Wood with dark firm rot, however, reduced yield and quality of the pulp even in proportions as low as 10% and should not be accepted for pulping. The colour of the decayed wood is considered the most practical and a fairly reliable method of judging the degree of decay and its effect on pulping, for most fungi; there are, however, certain exceptions and further investigation on the different fungi and their effect on pulp yield and quality is needed. Results are given in graphs and tables with English legends.

520. COHEN, W. E. **Some factors affecting the assessment of pulpwood quality.** [*Proceedings of the*] *Fourth Meeting of the* [*F.A.O.*] *Technical Committee on Wood Chemistry, Brussels* 1949 (7, 59–65 + 3 gphs.). P.R.

Important factors discussed are the selection of trees representative of the forest area or the species, the selection of samples representative of the trees, and the selection and preparation of chips for chemical analysis. A simple chemical test offering a short cut in the assessment of a new species is described. The data presented relate to work on *Eucalyptus*, but it is suggested that they may also be applicable to tropical species.

521. DOERING, H. Zur Bestimmung des Gesamtalkalilöslichen (Beta- plus Gamma-cellulose). **[The determination of the total alkali-soluble portion [of pulp]** (β- **plus** γ**-cellulose).]** *Papier, Darmstadt* 3 (3/4), 1949 (37–9). 7 refs. [G.g.] [Zentrallaboratorium der Aschaffenburger Zellstoffwerke AG.] L.S.

522. BALTZ, E. Zur Frage eines zweckmässigen Holzschleiferantriebes. **[Suitable drives for wood grinders.]** *Papier, Darmstadt* 3 (3/4), 1949 (45–8). [G.g.] L.S.

Discusses different types of drive and concludes that more use could be made of the synchronous motor.

523. ROBINSON, C. T. **Refining of rejects.** *Pulp Paper Mag. Can.* 51 (2), 1950 (54–8).

Presents the results of a questionnaire circulated to a group of Canadian newsprint mills concerning methods and equipment for the refining of coarse groundwood rejects to make newsprint pulp.

524. MCGOVERN, J. N., BROWN, K. J., and KRASKE, W. A. **Experiments on water and steam cooking of Aspen.** *Tappi* 32 (10), 1949 (440–8). 12 refs. L.S.

Chips of *Populus tremuloides* were subjected to water or steam cooking or oven heating, and then fiberized mechanically to produce pulp yields of 72–96%. For water cooking the following results were obtained: (1) pulp yield decreased with increasing temperature from 150 to 180° C., and increasing time from 0 to 60 minutes; (2) the rate of pulping was rapid to a yield of nearly 75% and then slow; (3) decreasing the ratio of water to wood produced the same yield in a shorter pulping time; (4) maximums in strength properties were shown at yields of 80–85% irrespective of working conditions; and (5) lignin and carbohydrates were removed at roughly the same rate down to pulp yields of nearly 75%. Similar results were obtained for steam cooking. Oven heating of chips at 170–200° C. in the absence of water degraded the pulps, reducing their strengths below those from untreated wood. Pulps produced in yields of 81 and 84% by water and steam cooking respectively were made into corrugating boards with strength properties equal or nearly equal to those of commercial hardwood semichemical corrugating board. *From authors' summary.*

525. **New hardwood pulp process announced.** *Timberman* 51 (6), 1950 (54).

'Chemiground', a new pulping process for hardwoods (Aspen, Birch, Beech and Maple) is announced by the Technical Association of the

Pulp and Paper Industry. The wood is first cooked in neutral sulphite liquors in the chemical ratio of 6 to 1 (Na_2SO_3 to $NaHCO_3$—total chemical 1½ lb./gal. expressed as Na_2CO_3). After the digester is charged, the air is removed from the wood and digester and the chemical liquor introduced. The wood is then cooked at 150° C. for 6 hr., at a pressure of 200 lb./sq. in. and then ground, preferably on dull-surfaced stones. The pulp is easily bleachable and costs only $40/ton as compared with $65/ton for ground Eastern Spruce, and there is a 25% greater recovery than with Spruce. [Cf. *For. Abstr.* 11 (No. 3025).]

526. **Chemi-groundwood process developed at N.Y.S[tate] C[ollege of] F[orestry].** *Paper Tr. J.* 130 (15), 1950 (27, 29–30, 32). P.R.

Describes in detail the apparatus and processes used for the chemical groundwood pulping of hardwoods [cf. preceding abstract] and research on it carried out at the New York State College of Forestry. Most of the preliminary work was done on 2-ft. wood; further experiments showed that 4-ft. wood needs high liquor concentrations but produces pulp as good as that from the shorter wood. A liquor concentration of 1 lb. chemical per gal. gave a good combination of strength and brightness with 2-ft. wood, and a concentration of 1·5 lb. per gal. gave pulp with better strength and lower brightness for 4-ft. wood. The cooking liquors can be re-used repeatedly, but chemicals must be added to replace the amount consumed (an average of *ca.* 10% of the dry wood weight). Experiments were made to show the effect of temperature of treatment on pulp quality. Treatments at 120° C. or less had practically no effect on the wood; treatments at 170° and above produced burnt heartwood; and at temperatures of 130–160° the brightness decreased, strength increased and power consumption decreased with increasing temperature. Temperatures of 150° are recommended, but 140° may be found better for some species. The type of stone used is unimportant in comparison with other variables; stronger pulps are produced when the stone is rather dull. Investigation on the effect of storing the treated wood indicates that wood ground not more than 16 hr. after treatment may produce pulp as much as 20% stronger and require 15% less power for grinding than wood ground immediately after treatment. Storage for periods up to 88 hr. produces small additional improvements in increased strength and lower power requirements. Storage causes a slight loss in brightness. A Birch pulp was bleached to 75% brightness with 3% Na_2O_2. Aspen was bleached to 76·9% brightness by $Ca(ClO)_2$ bleaching without, and to 81·2% with, the addition of Na_2SiO_3. Economic advantages of the process are lower power cost, greater production per grinder per hour, and higher yield per cord. These outweigh the disadvantages of extra labour and chemical costs of the pre-treatment.

527. Chidester, G. H. **Semichemical pulping.** *Prepr. U.S. For. Prod. Res. Soc.* 85, 1949. pp. 11. 7 refs. [U.S. Forest Products Laboratory, Madison.] P.R.

Describes the process and its chemistry, fibre characteristics, and the properties and uses of semichemical pulps.

528. McGovern, J. N., Keller, E. L., and Martin, J. S. **Pulps and corrugating paperboards from farm woodland Hickory.** *Rep. U.S. For. Prod. Lab., Madison* No. *R*1753, 1949. pp. 8 + 5 tbls. P.R.

Carya tomentosa and *C. glabra* were pulped individually and in mixture, by different methods. The strength of semichemical pulps and of corrugated boards made from them increased as the pulp yield decreased; pulps made in yields of 70–75% by weight of moisture-free wood were suitable for conversion into corrugated board equal in strength to many commercial hardwood semichemical corrugated boards. The sulphate pulp was made with a relatively small amount of chemical and had properties making it suitable for a filler pulp in printing, writing and tissue papers.

529. Jayme, G. Chemische Untersuchungen an Pappelhölzern. **[Chemical research on Poplar woods.]** *Papier, Darmstadt* 3 (17/18), 1949 (339–42). 10 refs. [G.] [Institut für Cellulosechemie an der technischen Hochschule, Darmstadt.] L.S.

The chemical composition of Poplar species in relation to ease of pulping and pulp yield are discussed. Tables are given to show the chemical composition of, and strength of pulp from, Poplar, Beech and Spruce, the yield of sulphate pulp from different Poplar species and

the strength properties of sulphite and sulphate pulps.

530. MURTO, J. O. Piirteitä sulfaattiselluloosan laadun kehittämismahdollisuuksista. **[Possible improvements in the quality of sulphate pulps.]** *Papp. Trävarutidskr. Finl.* 31 (17), 1949 (307). [Fi.e.] P.R.

In experiments on the effect of modification of cooking methods on the properties of Pine and Birch sulphate pulps, the hemicellulose content of the pulp was increased by the addition of elementary sulphur to the cooking liquor, and reduced by prehydrolysis with water. Further research is in progress. *From author's summary.*

531. HAMMOND, R. N., and BILLINGTON, P. S. **The relation of kraft pulp qualities to the wood properties of Douglas Fir.** *Tappi* 32 (12), 1949 (563–8). L.S.

Samples of rapid- and slow-grown wood of various ages (ranging from 350-year-old slow growth to 30-year-old rapid growth) were pulped and the pulp properties compared. The pulps from the younger wood generally showed higher yields, lower α-cellulose content, lower tearing strength, and higher bursting strength and sheet density values. These may be partly caused by the higher proportion of sapwood in the younger trees. Yields varied roughly with the proportion of sapwood. Bursting and peeling strength and sheet density varied directly, and tearing strength inversely with the proportion of springwood. The young woods produced pulp which bleached to a higher brightness under the same bleaching conditions, but suffered slightly more loss of strength in bleaching.

532. HEINIG, M., and MARTIN, J. S. **Sulfate pulping of dead, standing Jack Pine (*Pinus banksiana.*)** *Rep. U.S. For. Prod. Lab., Madison* No. *R*1746, 1949. pp. 4 + 5 tbls. P.R.

The pulping characteristics of a sample of dead standing Jack Pine were compared with those of 2 samples of green-cut material. The dead wood gave kraft-type pulps essentially as strong as those from the green-cut wood, but with slightly lower yield. The dead-cut wood had a lower moisture content and would give a lower weight of chips to a digester charge and less efficient use of digester space than green-cut wood, but had about the same moisture content as would be expected for green-cut wood stored for a year, as is common practice. *From authors' summary.*

533. HAMILTON, A. D. **Manufacture of wrapper from bark.** *Pulp Paper Mag. Can.* 51 (3), 1950 (205–10).

Experiments made at the Ontario Paper Co. Ltd. and the Quebec North Shore Paper Co. showed that although bark itself cannot be economically used for paper-making, woodroom waste, which contains both bark and a wood fraction, can be cooked with kraft chemicals to produce a useful wrapping paper. Methods used and the results obtained are described.

534. POTTER, G. J. C. **A review of the literature on the sulphite process September 1948–August 1949.** *Pulp Paper Mag. Can.* 51 (3), 1950 (300, 302, 304, 306). 32 refs.

535. RICHTER, G. A. **Certain factors that influence delignification in acid sulphite pulping.** *Tappi* 32 (12), 1949 (553–9). L.S.

536. Caratteristiche generali della micoflora della pasta-legno. **[General characteristics of the mycoflora of wood pulp.]** *Ann. Sper. agr.* (*n.s.*) 3 (2), 1949 (399–414). 13 refs. [It.it.e.] C.G.B.

There is a group of fungi constantly found among the heterogeneous components of the micro-organic flora of wood pulp. Imperfect fungi predominate in this group, followed by Basidiomycetes, Ascomycetes and Phycomycetes. The presence of yeasts is less regular. On the whole, the prevalent fungi are those that possess easy means of dissemination. The following factors have been studied in relation to the development of the fungi and their decaying action on wood pulp:—temperature, humidity, pH, chemical composition of the medium, and reciprocal biological influence.

537. BADE, O. M., and HOLTE, T. Kjemikaliebehandling av tremasse for å hindre soppskader. **[Chemical treatment of wood pulp to prevent fungus damage.]** *Norsk Skogind.* 4 (2), 1950 (29–34). [Nor.e.] [Papirindustriens Forskningsinstitutt.] P.R.

Further research on the use of organic phenyl Hg compounds. [Cf. *For. Abstr.* 11 (No. 2062).]

33.32.3. *Wallboards. Fibreboards, etc.*

538. HOLM, R. **Porous fibreboards and their production in Finland.** *Metsät. Aikak.* 1949 (6/7), (226, 229). [E.]

539. KOLLMANN, F. Holzfaser- und Holzspanplatten. [**Wood fibre and wood waste boards.**] *Svensk PappTidn.* 53 (4), 1950 (103–9). P.R.

Abstracts of papers given at a meeting of the Deutsche Gesellschaft für Holzforschung.

540. KOLLMANN, F. **Properties, testing and classification of wood-fibre and wood-waste boards.** *Transl. For. Prod. Aust.* 1949. pp. 26 + 4 dgms., 20 gphs., 1 tbl. Transl. by E. Selman-Towt from *Svensk PappTidn.* 52 (10), 1949 (251–67). [*For. Abstr.* 11 (No. 1298).] P.R.

541. ASPLUND, A. **Preparation and characteristics of fiber pulp for hardboard.** *Bull. Ntheast. Wood Utiliz. Coun.* No. 31, 1950 (24–42). [A. B. Defibrator, Sweden.] P.R.

The manufacture, properties and testing of hardboard pulps are described, and the relationship between wood strength and that of the finished board is discussed. A table is given showing tensile-strength relationships between different species of wood, hardboard and metals.

542. ELMENDORF, A. **Thick composition boards made of veneer waste.** *Lumberm.* 77 (3), 1950 (77–8).

Some practical information on methods of manufacture.

543. OTHMER, D. F., and RICCIARDI, L. G. **Wallboard from wood waste without resins by a dry process.** *Bull. Ntheast. Wood Utiliz. Coun.* No. 31, 1950 (59–77). [Polytechnic Institute of Brooklyn, New York.] P.R.

The process consists in adding very cheap chemical materials (not resins) to the fine wood waste, thoroughly mixing and pressing the mixture in a heated press at *ca.* 500–700 lb./sq. in. for about 10 minutes. Hardwoods and softwoods of any species, and their mixtures, may be used, and the chemicals may be different for different boards. Chemicals may also be added to the original mixture to increase hardness and the resistance to water, fire and insects. The boards can be embossed with various designs by the use of special face-plates, and it is believed that the material may be used instead of expensive plastics for flat moulded objects such as electrical outlet plates and miniature toys. Results of experiments at the Polytechnic Institute of Brooklyn on species, fineness of fibre, moisture content, pressure, time of pressing, and specific gravity are tabulated. Estimated figures of costs are given.

544. GOSS, W. C. (to United States Sheetwood Co.). **Sheet lumber.** *U.S. Patent* No. 2,485,587, Oct. 25, 1949. *Chem. Abstr.* 44 (5), 1950 (2240–1). P.R.

Wood-waste material, such as sawdust, chips and shavings, is boiled in water or steamed. After removal of the excess of water it is passed through an attrition-type grinder together with a bonding agent derived from a brown-rotted wood. The ground mixture is then formed into a matted layer of uniform thickness and pressed at about 350° F. The resultant sheet is homogeneous, strong, water-resistant and has a high degree of dimensional stability.

545. BRYANT, L. H., HUMPHREYS, R. F., and MARTIN, P. J. **Structural and insulating boards from sawmill waste.** *Nature, Lond.* 165 (4200), 1950 (694).

The division of Wood Technology, Forestry Commission of New South Wales, has made good, low-cost boards from bark/sawdust mixtures of *Callitris glauca*, by causing this waste material to react with small quantities of paraformaldehyde at temperatures and pressures obtainable on the type of press used in Australia for the hot pressing of plywood; $\frac{3}{16}$-in. boards containing equal parts by weight of sawdust and ground bark with 1% by weight of paraformaldehyde have been formed by pressing for 3 min. at 180 lb./sq. in. at 140° C. The boards have mechanical and water-resistant properties similar to fibre-boards such as Masonite. For plants operating in conjunction with sawmills, the cost of raw materials, including the paraformaldehyde, should not exceed 3*s.*/100 sq. ft.

546. **New wall board produced from granulated wood particles.** *Lumberm.* 77 (3), 1950 (81).

Resinwood, produced by Rock Island Millwork Co., is manufactured from granulated

waste-wood particles and phenolic resin in a 10-platen hot press. Ten 8 × 8-ft. panels are turned out simultaneously. They have a fine, smooth surface, resembling natural Pine, and great strength and hardness.

547. KEATON, C. M. **Phenolic resins in hardwood.** *Lumberm.* 77 (3), 1950 (90). [American-Marietta Co.]

The use of water-soluble phenolic resins in the western wet process is comparatively new, but has already demonstrated its commercial value. Tests made at the company's laboratory indicated that a mixture of alum and H_2SO_4 was the best precipitating agent. With Amres 113 resin, best results were achieved if the resin was dispersed in the pulp at a pH of 7·5 for about 60 min. and then held at a precipitation pH of 5·5 for 30 min. In general, the dimensional stability and strength of the board are directly proportional to the effectiveness of the fibre bonding. A resin content of 1–3% proved most suitable.

548. WYSS, O. **Resin bonded boards from wood waste.** *Bull. Ntheast. Wood Utiliz. Coun.* No. 31, 1950 (49–58). [Interwood Ltd., Zurich.] P.R.

Homogenholz N, a resin-bonded fibreboard manufactured by a wet process, is produced with different densities, dimensions and resistance to abrasion. Thick hardboards (10–15 mm. thick and with a length of 2·5 m.) have been glued to give structural beams of 24 m. free span and a mechanical strength of 300–400 kg./sq. cm. Another use of the boards, after special treatment to make them air-tight and acid-proof is as a substitute for the normal lead-lined containers for acid; they were found to resist 50% H_2SO_4 at temperatures of up to 100° C. over long periods. Homogenholz T is a resin-bonded board manufactured by a dry process. Two special disintegrators have been designed to produce shavings of a special shape —(1) long leaf-like shavings, 0·1–0·5 mm. thick, 5–20 mm. wide and 20–80 mm. long; (2) long thin fibre-like shavings. Wood waste in the form of branches or sawmill waste can be used. Boards of different densities are suitable for furniture and for structural boards.

549. MARPILLERO, P. **The Xilon and Abikraft processes for wallboard manufacture.** *Bull. Ntheast. Wood Utiliz. Coun.* No. 31, 1950 (43–8). [Azienda Brevetti Industriali, Milan.] P.R.

Cf. *For. Abstr.* 10 (No. 1249).

550. NARAYANAMURTI, D., RANGANATHAN, V., and GEORGE, J. **Studies on building boards. Part I. Utilization of Areca nut husk.** *Indian For. Leafl.* No. 112, 1947 (1948). pp. 9. Price *As.* 4 (5*d.*).

A good insulating wool was produced by beating air-dry husks of *Areca catechu* nuts with a wooden mallet. The thermal conductivity of this wool compares favourably with that of other insulating materials. After a process of defibration or hydrolysis with weak acid or alkali, the husks were used for the manufacture of insulating and hard boards. Tabulated results of tests for strength, thermal properties, and moisture absorption and swelling, show that they compare favourably with other building boards.

551. DALE, J. D. **Durisol light weight pre-cast concrete.** *Bull. Ntheast. Wood Utiliz. Coun.* No. 31, 1950 (79–87). P.R.

Describes the manufacture and physical properties of Durisol, a precast concrete material consisting of chemically mineralized wood shavings and Portland cement. [Cf. *For. Abstr.* 9 (No. 1837); 10 (No. 649).]

33.32.4. *Plastics*

552. MEILER, J. G. (to Diamond Alkali Co.). **Plastic products from wood.** *U.S. Patent* No. 2,490,078, Dec. 6, 1949. *Chem. Abstr.* 44 (5), 1950 (2242). P.R.

Wood digested in kraft-process black liquor containing elemental S, with the pH of the solution controlled between 4·5 and 9·5, forms a moulding compound of high strength, and high shock and water resistance.

553. FARBER, E. (to Timber Engineering Company, Washington, D.C.). **Process of treating lignin residues.** *Can. Patent* No. 463,740, March 14, 1950. *Abstr.* in *Paper Tr. J.* 130 (13), 1950 (29). P.R.

Describes a process of treating the lignin residue of the hydrolysis of the carbohydrates of wood, by mixing it in the proportions by weight of 100 parts residue/20–200 parts of the alkali and heating the mass, maintaining

the temperature between *ca.* 150° C. and the charring temperature of the residue until the residue has substantially resinified.

33.33. Manufacture of Textiles and Cellulose Derivatives from Wood

554. CENTOLA, G. **The suitability of cellulose pulps for rayon production.** [*Proceedings of the*] *Fourth Meeting of the* [*F.A.O*] *Technical Committee on Wood Chemistry, Brussels* 1949 (11, 139–45). 22 refs. P.R.

A laboratory method for determining the filterability of viscose was worked out, and the relationship between the macro-molecular structure of pulps and the filterability of viscose from them was established. Pulps from straw and other annual crops showed bad filtration because of their high contents of β- and γ-cellulose. In Spruce pulps, constituents of high molecular weight with degrees in polymerization above 1,500 had a bad effect on filtration. Heartwood of Beech produced pulp which did not filter easily and contained large numbers of molecules with an exceptionally high degree of polymerization; the sapwood from the same tree yielded an easily filterable viscose and contained no high polymers.

555. SCHNEIDER, E. Zur Beurteilung von Zellstoffwatten. [**The examination of cellulose wadding.**] *Pharmazie, Berlin* 3 (11), 1948 (503–5). 1 ref. [G.] L.B.A.

Discusses the manufacture and quality of cellulose wadding and describes methods of identifying cotton, hardwood and softwood and straw fibres.

556. HECHLER, G. Die Einwirkung von Nitriersäuregemischen auf Hölzer. [**The effect of mixed nitrating acids on wood.**] *Holzforschung* 4 (2), 1950 (33–44). 11 refs. [G.g.] [NC-Laboratorium der Dynamit A.-G. Troisdorf.] P.R.

Wheat straw, Beech and Spruce were treated with different nitrating acid mixtures and the yield, N content, stability, methoxyl content and solubility in organic solvents were determined. The effect of temperature and of methoxyl content on nitration with different mixtures of acids was investigated. The effect of pre-treatment, such as hydrolysis, delignification, or treatment with alkalis, on the solubility of the nitrated wood substance and on yield was examined. Results are tabulated and the following conclusions drawn: (1) The direct nitration of wood, for use in the production of explosives and for other uses, is possible and gives yields varying in quantity with the nitrating acid used. (2) The solubility of the nitrated products varies with the nitrating acid. (3) Spruce gave the highest yield, then Beech, then straw, suggesting a possible inverse relationship between pentosan content and yield; however, removal of the pentosans by prehydrolysis made no significant difference to yield or solubility after nitration. Similarly nitration of wood after delignification or alkali treatment showed results differing little from those obtained by nitration of untreated wood. The possibility of obtaining information on the chemical composition of wood from nitration methods is discussed. Results of denitration of the nitrated material are tabulated and discussed, but provide no conclusive evidence on wood chemistry.

33.34. Dyeing and Bleaching of Wood

557. MOLOTKOV, P. I. Oblagorazhivanie ol'khovoy drevesinȳ. [**The improvement of Alder wood** [: **staining wood in the living tree by injecting $CuSO_4$ solution**].] *Lesn. Khoz.* 1950 (1), (75). [Russ.]

The author introduced into living Alder [*Alnus glutinosa*?] trees 0·5–1% solutions of $CuSO_4$ without admitting air. [The method of introduction, amount of solution injected, and interval before felling, are not stated.] Wood so treated for 5–10 days acquired resistance to fungi and was greatly improved in colour and appearance, becoming a dark brown, like Walnut-wood, and shining when polished, and the figure was also brought out more clearly. Soaking for 5 days, and even boiling, did not materially affect its appearance. It is suggested that such improved wood should be a good substitute for more expensive species in cabinet-making etc.

33.36. Wood Finishes. Preservation of Wood. Seasoning and Drying

33.36.1. *Preservation against Attack by Plants and Animals*

See also *For. Abstr.* 12 (Nos. 400, 428–9, 611, 705).

558. STEER, H. B. **Wood preservation statistics, 1948.** *Repr.* from *Proc. Amer. Wood Pres. Ass.* 1949. pp. 41 + 1 map, 22 tbls. P.R.

559. DAVIS, P. C. **A table of differences for tank reading temperature conversions.** [*Prepr.*] *Amer. Wood Pres. Ass.* 1950. pp. 2. P.R. [C. B. & Q. Wood Preserving Plant, Sheridan, Wyoming.]

A conversion table to simplify calculations on retention of preservative from volume readings.

560. VAUGHAN, J. A. **Characteristics and related toxicity of hydrocarbon oils.** *Petrol Processing, Cleveland, Ohio* 3 (3), 1948 (237–8, 240). 9 refs. L.S.

Cf. *For. Abstr.* 10 (No. 473).

561. MAYFIELD, P. B. **The analysis of creosote-petroleum solutions used in wood preserving.** [*Prepr.*] *Amer. Wood Pres. Ass.* 1950. pp. 6. 5 refs. [The Barrett Division Allied Chemical and Dye Corporation, New York.] P.R.

562. CLAPP, W. F. *et al.* **Co-operative creosote tests.** [*Prepr.*] *Amer. Wood Pres. Ass.* 1950. pp. 12. P.R.

A progress report on trials being carried out by various firms and laboratories in co-operation, of various creosotes in stake and post tests, marine-borer exposure tests, and various laboratory tests.

563. BECKER, G. Der Wert von Steinkohlenteeröl-Bestandteilen für den Holzschutz. **[The value of coal-tar fractions for preserving wood.]** *Repr.* from *Mitteilungen der deutschen Gesellschaft für Holzforschung* No. 37, 1949 (181–97). [G.] [Materialprüfungsamt Berlin-Dahlem.] P.R.

A review of literature on the efficacy of the different fractions and on methods of application.

564. KROULÍK, A., and SOUKUP, J. Impregnace dehtovým olejem s butanolem. **[Impregnation with tar oil and butanol.]** *Lesn. Práce* 28 (6/7), 1949 (241–5 + 2 plates). [Cz.russ.e.]

Simple preliminary tests of the non-pressure penetration of mixtures of tar oil with 10–30% of butanol showed that these penetrated better than tar oil alone. The best results with air-dry wood were given by the 30% butanol mixture in the case of Scots Pine and Norway Spruce, and by the 10% butanol mixture in that of Beech. Simultaneous tests were made with green wood of these species, but only in one case—that of Scots Pine with the 30% mixture—was penetration better than in air-dry wood, and results with green wood in general were poor.

565. KREMERS, R. E. (to General Foods Corp.). **Decarboxylation of *o*- and *p*-hydroxybenzoic acids [for wood preservatives].** *U.S. Patent* No. 2,488,472, Nov. 15, 1949. *Chem. Abstr.* 44 (6), 1950 (2560–1). P.R.

566. KROGH, P. M. D. **The use of pentachlorophenol in wood preservation in South Africa.** *J. S. Afr. For. Ass.* No. 19, 1950 (11–7).

Describes 4 very efficacious preservatives developed by the Forest Products Institute, Pretoria: castor-oil solution of pentachlorophenol with mineral turpentine diluent (TK/PCP); castor-oil solution of pentachlorophenol with power paraffin diluent (TRI/PCP); fuel-oil solution of pentachlorophenol (FPI/PCP); and creosote preservative with pentachlorophenol (PCP/FO-Creosote). TK/PCP proved most satisfactory. The function of the castor oil was to dissolve the PCP and also to prevent blooming; the diluent was for the purpose of reducing surface tension. The prohibitive rise in cost of castor oil led to further experiment and the development of TRI/PCP; the power paraffin not only diffuses perfectly with the solutions but, since it is itself a solvent of PCP, it greatly diminishes the quantity of castor oil needed to carry the same quantity of PCP. TRI/PCP (5% PCP, 7% dehydrated castor oil, 88% power paraffin) is the most important development to date for the preservation of general building timbers. It effects a saving of castor oil without decreasing efficiency or anti-blooming; it costs much less than TK/PCP (which has 15% castor oil), and operating costs are not raised. The treated material, moreover, is readily painted. Both these solutions

were developed particularly for the treatment of wood *in situ*. They leave the wood clean and paintable without oil or blooming on the surface. Treatment does not cause shrinkage or swelling, and re-seasoning is not required as for water-borne solutions. FPI/PCP is a still cheaper preservative (23*d.*/gal. compared with 40*d.* for TK/PCP and 31*d.* for TRI/PCP), in which fuel oil is substituted for castor oil, and 5% of resin is added to prevent blooming. Wood treated with this should not be painted for a year afterwards. Its chief disadvantage is that the fuel oil exudes and causes discoloration on walls and untreated wood etc. with which it may come in contact.

Pine wood may be impregnated with any of these low-tension solutions by cold soaking for 3–30 minutes. For Spruce and hardwoods, cold, low-pressure treatment is necessary. A simple plant for doing this is described and illustrated. Composition and cost of all 4 solutions are given in a table.

Investigations were also made into means of mixing creosote with available fuel oils without occasioning sludging. It was eventually discovered that, if diluted with 30% of a certain oil not hitherto used in wood preservation, fuel oil would diffuse excellently with an equal volume of South African standard creosote. This bridging agent, known as 'Sovaloid W', marketed by the Vacuum Oil Co. of S. Africa, is one of the group of organic compounds known as aromatic oils. To restore the toxicity and repellence sacrificed by the dilution, PCP crystals in the proportion of 2½% of the mixture's weight are added. The resulting preservative penetrates only slightly less easily than pure creosote.

567. CHISHOLM, T. H., and SUGGITT, J. W. **Copper pentachlorophenate as a wood preservative.** *Chemistry in Canada, Ottawa* 1 (6), 1949 (30–3). [Hydro-Electric Power Commission of Ontario.] L.S.

Cu pentachlorophenate, in spite of excellent preservative properties, has not been used commercially, because of its insolubility in water and its varying degrees of solubility in organic solvents; the cost of a straight organic solvent carrier has probably been the deterrent. A treating solution consisting of Cu and pentachlorophenol in a dilute ammoniacal organic solvent promises to be economically and technically suitable. Two examples of the more suitable of various materials are $CuSO_4$ with the water-soluble Na salt of pentachlorophenol and copper carbonate with pentachlorophenol. The Cu salt is taken to the cuprammonium state by the addition of excess ammonia, and to this is added the pentachlorophenol dissolved in a dilute water-miscible organic solvent carrier. If either the ammonia or the solvent falls below a lower limit, the solution ceases to be stable and the Cu organic salt precipitates out. After the wood has been impregnated and exposed to air the cuprammonium complex breaks down; the ammonia volatilizes and the Cu pentachlorophenate is precipitated within the wood. Results of laboratory studies on the properties of Cu pentachlorophenate are tabulated. (1) It is practically water-insoluble, and should provide an almost permanent treatment. To confirm this, leaching tests on treated wood blocks are in progress. (2) It is slightly less volatile than pentachlorophenol and loss of preservative at normal temperatures should be slight. (3) Growth of cultures of *Lentinus lepideus*, *Lenzites sepiaria* and *Fomes pini* was inhibited by a concentration of 0·0005%; in Jack Pine (*Pinus banksiana*) sapwood blocks, decay was completely prevented by a retention of 0·02 lb./cu. ft. (4) Cu pentachlorophenate has been shown to give satisfactory protection against termite attack [see *For. Abstr.* 9 (No. 2431)]. (5) In static bending tests, the strength of treated specimens was equal to or greater than that of untreated controls. (6) Treated wood was slightly harder than untreated wood. (7) No abnormal variation in dimensional stability was noticed. Field exposure tests are in progress. Pilot plant treatment has been carried out. As long as the concentration of ammonia exceeded 2% and that of the organic solvent 10%, the pentachlorophenate was held in solution. The ammonia evaporated very rapidly when the wood was removed from the cylinder, but all the ammonia did not evaporate for several weeks. Indoors, the heavy fumes were very objectionable, but this would not apply to commercial practice, where treatment is done out of doors. The cost of the treatment compares favourably with that of creosote; the greater cost of seasoned poles necessary for satisfactory treatment with Cu pentachlorophenate is offset by (1) saving of steam, as neither preservative nor timber is heated and (2) reduction of treating time.

568. INOUYE, Y., NAKAMURA, T., and NISHIMOTO, K. **Studies on the wood preservatives. (1) The sterilizing power of *o*-cresol sulfur resin against wood-destroying fungi.** *Wood Res., Kyoto* No. 4, 1950 (19–23). 4 refs. [Jap.e.]

In experiments made to find wood preservatives using materials common in Japan, S_2Cl_2 was added to *o*-cresol in the proportions 2, 1, or 0·5 : 1 mol. The preservatives were tested for their toxicity to *Schizophyllum commune* and *Polystictus sanguineus*, by the nutrient agar method. Maximum efficacy was reached with an *o*-cresol/S_2Cl_2 ratio of 1 : 0·5. Complete inhibition was given by this mixture at a concentration of 0·05% and the fungi were killed at 0·08%. *From authors' summary.*

569. MATAGRIN, A. Méthodes nouvelles de protection des bois d'oeuvre. Inconvénients de l'humidité; hydrofugation des lignocelluloses; défense contre champignons microscopiques et bactéries du bois. [**New methods of protecting timber. Dangers of a high moisture content; the waterproofing of lignocelluloses; protection of wood against microscopic fungi and bacteria.**] *Rev. int. Bois* 17 (154), 1950 (79–85). 31 refs. [F.]

Cf. *For. Abstr.* 11 (No. 491).

570. VERRALL, A. F., and SCHEFFER, T. C. **Control of stain, mold and decay in green lumber and other wood products [by dip treatment and improved handling methods during air seasoning].** *Prepr. U.S. For. Prod. Res. Soc.* 58, 1949. pp. 9. [Division of Forest Pathology, Bureau of Plant Industry, Soils, and Agricultural Engineering, U.S. Department of Agriculture.] P.R.

571. SCOTT, M. H. **Dry rot in building timbers.** *Bulletin, National Building Research Institute, Pretoria* No. 3, 1949 (39–45). D.S.I.R.

Discusses, with particular reference to the S. African climate and methods of building construction, the conditions favouring the establishment and spread of dry-rot fungi (*Coniophora cerebella*, *Poria vaporaria* and *Trametes serialis* are commonest; *Merulius lacrymans* is rare); preventive measures, including good building construction and the increased use of durable timbers (e.g. Rhodesian Teak [*Baikiaea plurijuga*], Teak, Jarrah [*Eucalyptus marginata*], Mauve [*Erythrophleum* spp.], Iroko [*Chlorophora excelsa*], Kiaat [*Pterocarpus angolensis*], and Matumi [*Adina microcephala*]; and the use of wood preservatives.

572. RICHARDSON, S. A. **Detecting [and controlling] dry rot.** *Timber News* 58 (2129), 1950 (99–100, 102). (*Monthly Bulletin of the British Wood Preserving Association.*)

573. NAUDE, T. J. **Research on the control of insect pests.** *Fmg. S. Afr.* 24 (285), 1949 (574–81). [Division of Entomology, Department of Agriculture, Pretoria.] E.M.B.

This general review of the work of the division during 1948–49 includes a short account of house surveys and biological studies of *Hylotrupes bajulus* in S. Africa, in which the following points were established:—Peak emergence occurred at the end of December and the sex ratio was 1 ♀/1·4 ♂. Development was much faster in freshly felled timber than in seasoned. A factor limiting the spread of *H. bajulus* is thought to be the rapid disintegration of stumps in the Pine plantations where heavy mists and high humidity occur. The fumigant MeBr gave promising results in tests, the gas penetrating at least 2 in. into the wood, and eggs being killed.

574. SCHULZE, B. Neue Schutzmittel gegen holzzerstörende Pilze und Insekten. [**New preservatives against wood-destroying fungi and insects.**] *Bauplanung und Bautechnik, Berlin* 2 (2), 1948 (55–8). [G.g.] L.C.E.

Presents in graphs and tables results of experiments carried out at the Materialprüfungsamt, Berlin-Dahlem, on the use of HF compounds and their efficacy against *Hylotrupes bajulus*. [Cf. *For. Abstr.* 11 (No. 3075).]

575. PLANK, H. K., and FERRER-DELGADO, R. **Permanence of DDT in powder-post beetle control in Bamboo.** *J. econ. Ent.* 42 (6), 1949 (963–5). 3 refs. [U.S.D.A., Agr. Res. Adm., Office of Experiment Stations, Mayaguez, Puerto Rico.]

Green and partly dried sections of Bamboo (*Bambusa vulgaris*) were dipped whole for 10 min. in a 5% solution of DDT in fuel oil, and in the solvent alone, for protection against internodal infestation by *Dinoderus minutus*. The solution alone gave some protection, but this was only significant on partly dried material and for 6 months after application. The DDT

gave a high degree of control, lasting for 12 months on both green and partly dried Bamboo. The protection was more permanent on green culms, a more persistent film of residue having formed on the surface. Pieces of Bamboo, with a proportion of cut and inside surface greater than that of the outside surface, remained uninfested for 24 months after dipping. Small lots of commercial Bamboo, either split or with the septa broken at the culm nodes, remained free of infestation for 30 months of service. [Cf. *For. Abstr.* 10 (No. 488); 12 (No. 206).] *From authors' summary.*

576. FEYTAUD, J. Comparaison des effets de l'hexachlorocyclohexane (H.C.H.) et du dichlorodiphénytrichloroéthane (D.D.T.) sur les *Reticulitermes.* **[Comparison of the effects of 666 and DDT preparations on *Reticulitermes.*]** *C.R. Acad. Agric. France* 35 (12), 1949 (551–3). [F.] A.P.B.

R. lucifugus was the subject of these laboratory experiments. When trichlorethylene (itself an insecticide) was used as a vehicle, its action ceased after 24 hours, whereas that of the 666 and DDT persisted over a long period (16 months up to the date of writing). The toxic effects of the 666 on the termites were more spectacular than those of the DDT, and there were indications that DDT acted as a stomach poison, and 666 as a contact poison.

577. HETRICK, L. A. **The toxicity of some organic insecticides to the eastern subterranean termite.** *J. econ. Ent.* 43 (1), 1950 (57–9). 4 refs. [University of Florida, Gainesville.]

Laboratory tests with treated soil lasting over a period of 3 years demonstrated that γ666 and Chlordane in very light solutions have outstanding toxicity to termites. Similar dilutions of the pentachlorophenols failed during the early months of the test. Toxaphene, DDT and its analogues, and parathion, remained active in the treated soil and showed some promise. Although the pentachlorophenols are less toxic to termites than the newer organic insecticides, their fungicidal properties make them useful in practical control measures. *From author's summary.*

578. SHELFORD, V. E. **Termite treatment with aqueous solution of Chlordane.** *J. econ. Ent.* 43 (1), 1950 (107–8). 1 ref.

Soil treated in 1947 had retained its toxicity two years later, as witnessed by tests made in 1949 [cf. *For. Abstr.* 11 (No. 1329)]. There was no difference in toxicity of soil samples from a depth of 3 in. and 8 in., and no correlation with the amount of aqueous solution injected, which varied from point to point. No significant conclusions could be drawn from experiments to find the order of preference of the termites for different woods.

579. HUNT, R. W. **The common drywood termite as a pest.** *J. econ. Ent.* 42 (6), 1949 (959–62). 1 ref.

Since 1934, *Calotermes minor* has become an increasingly important pest in southern California. A brief description is given of the termite and its habits with some suggested causes of its increase. The most recent advance in its control is fumigation. Both HCN and CH_3Br have been used with good results. Dosage ranges from 2·5–3 lb./1,000 cu. ft. of space, and the exposure period from 18–48 hrs. Type and size of structure and the sealing problem involved are the primary factors in determining costs.

580. TURNER, N. **Control of termites in buildings.** *Circ. Conn. agric. Exp. Sta.* No. 172, 1949. pp. 8.

581. **A new tool for termite work [: an all-purpose impact tool, used mainly for drilling or wood boring].** *Pest Control* 18 (2), 1950 (28, 36). D.S.I.R.

582. ZIMMERN, A. **Safety engineering in termite control.** *Pest Control* 18 (2), 1950 (30, 32, 34). D.S.I.R.

Makes recommendations for protecting men working on termite control against the chemicals used and against danger from the use of electric power tools.

583. HUFFMAN, J. E. **Treated timber in the coal mining industry—its application and economic justification.** *J. For.* 48 (5), 1950 (325–8).

Of the 2,400 million bd. ft. of timber used annually in the production of coal in the U.S.A., 15% is classified as 'permanent' and should be treated. Actually, only about 10% of this 'permanent' timber is at present treated.

584. KEELEY, D. E. **The preservation of timber by chemical treatment at McIntyre.** *Canadian Mining and Metallurgical*

Bulletin, Montreal 42 (451), 1949 (606–17). D.S.I.R.

$ZnCl_2$ has been used as a preservative in the McIntyre mines since 1930, and chromated $ZnCl_2$ since 1945. Figures are given for the quantity of timber treated annually and the estimated saving in comparison with the use of untreated timber. Schedules are given for treatment of Spruce, Douglas Fir, Jack Pine and hardwoods (sawn timber including Elm, Maple, Beech, Oak and Ash), and for treatment, at a neighbouring mine, of Spruce and Douglas Fir with Osmotite Special, a preparation containing 76% NaF, 13% dinitrophenol and 11% K_2CrO_4. Tank corrosion in the $ZnCl_2$ treatment is prevented by the addition of a small amount of creosote to the solution carrying the preservative; this is deposited on the walls of the tank, completely covering the surface of the metal. It is not considered likely that the small amount of creosote deposited as a thin film on the timber during treatment will increase the risk of fire in the mine. The structure and treatment of ventilation and fire doors is described, and the results of heat and flame tests on treated and untreated doors are tabulated. They indicate that a door of seasoned Spruce treated with a 17% chromated $ZnCl_2$ solution (retention 3 lb. dry salt/cu. ft.) may be expected to remain useful for ½ hr. when exposed to a temperature of 1,740° F., ¾ hr. at 1,350°, and 1½ hrs. at 1,025°. The wood may be made more fireproof by the addition of ammonium phosphate or sulphate, or borax, to the preservative.

585. CRAWFORD, F. S., and WIRKA, R. M. **A test of treated timbers in a mine at Negaunee, Mich.** *Report of Investigations, U.S. Bureau of Mines* No. 4622, 1950. pp. 6. P.R.

In a service test of Maple timbers treated by the hot-and-cold-bath method and installed in main haulage ways, $ZnCl_2$-treated timbers had an average useful life of 13·3 years, borax-treated timbers 11·2 years, NaF-treated timbers 7·7 years, and untreated controls 3·8 years. The wide variations in absorption and penetration of the 3 chemicals invalidated any comparison of their relative efficacy.

586. HERTZLER, R. A., and SMITH, W. R. **The preservative treatment of Virginia's fence posts.** Division of Planning and Economic Development, Richmond, Virginia. [1949]. pp. 26.

Prepared by Southeastern Forest Experiment Station, Asheville, N. Carolina.

587. STACEY, W. A. **Wood posts in railway right-of-way fences.** *Wood Pres. News* Apr., 1950 (46–7, 50). P.R.

588. **Odorless box preservative fills agricultural needs.** *Wooden Box & Crate, Washington, D.C.* 11 (4), 1949 (7–10). P.A.T.R.A.

Laboratory tests (accelerated graveyard tests, tropical chamber tests, and exposure to pure cultures of *Trichoderma* for 14 days) of Nuodex 136 as a preservative for wooden picking boxes for fruit and vegetables, gave good results. Tests on its toxicity showed that it was harmless to rabbits in high concentrations. It is effective when applied by cold dipping, economical, easy to handle, safe to use, odourless, colourless, penetrating, and resistant to leaching and evaporation. Service tests are recommended.

33.36.2. *Fireproofing*

See also *For. Abstr.* 12 (No. 584).

589. LAWSON, D. I. **Ignition of cellulosic materials.** *Fire Prot., Lond.* 13 (115), 1950 (218–9).

All cellulosic materials begin to decompose rapidly at about 450° F., evolve inflammable gases, and have a specific heat of 0·54 B.T.U.; they differ in density and thermal conductivity. The time a material takes to reach the temperature at which decomposition starts will depend on a quantity Kds, where K is the thermal conductivity, d the density and s the specific heat. Figures showing K, d, and Kd are given for Oak, Mahogany, White Pine, fibre insulating board and Balsa; the Kd values range from 1 for Oak, to 0·08 for fibre board and 0·06 for Balsa. Building boards, which must be light and good thermal insulators, ignite easily. Some fire-retardant treatments are: coating the material with asbestos paper; 2 coats of distemper; fire-retardant paint; aluminium sheeting. Some chemicals, e.g. monammonium phosphate and some metallic chlorides, alter the thermal decomposition products of wood so that the proportion of charcoal to gaseous products increases; charcoal is a poor conductor of

heat and burns slowly, forming an insulating layer for the wood.

590. TRUAX, T. R. **Making wood fire retardant [: a review of methods].** *Rep. U.S. For. Prod. Lab., Madison* No. *D*1760, 1950. pp. 8. 10 refs. P.R.

Prepared for presentation at a meeting of the American Railway Engineering Association Committee 6, Chicago, March 1950.

33.36.3. *Seasoning. Drying*

See also *For. Abstr.* 12 (Nos. 409, 459).

591. OGURA, T. **Study of the mechanism of wood drying. A first report on the relation of rate of surface evaporation and moisture-conductivity to wood thickness.** *Bull. For. exp. Sta., Meguro, Tokyo* No. 42, 1949 (11–25). 7 refs. [Jap.jap.e.]

Preliminary experiments with test pieces of *Fagus sieboldii*, 7 × 4 cm. and 0·2, 0·5, 0·8 and 1·1 cm. thick, kept at 45° C. and 50% relative humidity, gave the following results: (1) Rate of surface evaporation: Above 70% moisture content, the rate hardly varied, whatever the thickness of wood. Below 70%, the rate decreased gradually until, at a certain critical %, which was the lower the thinner the sample, it dropped sharply. Below 30% it was inverse to thickness and at 9% evaporation stopped. (2) Moisture conductivity values ($\times 10^{-3}$) obtained for each thickness, viz. 2·05, 4·49, 6·05, and 7·28 respectively, were in fair agreement with theoretical values; below 20% moisture content, conductivity remained practically constant.

592. RIETZ, R. C. **Quality control and seasoning.** *Prepr. U.S. For. Prod. Res. Soc.* 48, 1949. pp. 11. [U.S. Forest Products Laboratory, Madison.] P.R.

Sampling by oven drying and by moisture meters was used in 2 furniture plants to establish and maintain a desired average moisture content and an acceptable standard of deviation. Standards of uniformly low moisture content were attained and kept.

593. [STEVENS, W. C.] **American kilning practice.** *Timb. & Plyw.* 98 (2547), 1950 (706, 708, 710). P.R.

In the stress-schedule technique evolved at Madison, temperatures are kept low and humidity high until test prongs indicate that the surface layers are in compression; after this point it is asserted that no checking can take place and the humidity is therefore reduced; when the moisture content of the core has been lowered below fibre saturation point, there is, it is held, no risk of honeycombing, and the temperature is raised to about 180° F. In recent tests at Prince's Risborough, test prongs did not indicate that the surface layers were in compression until an average moisture content of 25% was reached; if the comparatively low temperature and high humidity suggested are maintained to that point the drying rate will be decreased not increased, and although the very severe conditions at the end of the cycle will reduce the final stages of drying, in English practice, where the standard final moisture content is 12%, no great saving is likely in the over-all time of seasoning. In American practice, where the final moisture content is 6%, much more time is saved. Advantages of the American practice of seasoning narrow widths of timber and gluing them into boards and squares are: reduction in distortion during later use, cutting out of knots and splits, and saving of time and money by seasoning smaller material. Apparatus (kilns, trucks etc.) and methods (Taylor-Colquitt, high-frequency and chemical seasoning) are described.

594. BILLIG, K. **High frequency currents for timber processing.** *Timber News* 58 (2129), 1950 (114, 117–8).

Describes Russian methods of seasoning and gluing wood by radio-frequency heating and gives figures for time of seasoning, expenditure of energy, and costs.

595. ANDERSON, A. B., and HERMANN, A. (to Western Pine Association, Portland, Oregon). **Process of treating wood.** *U.S. Patent* No. 2,500,783, March 14, 1950. *Abstr.* in *Paper Tr. J.* 150 (13), 1950 (28). P.R.

Describes a process of treating timber to remove excess moisture and at least a portion of the extractives by: (1) placing the timber in a position with the resin ducts roughly vertical (2) running a water-miscible solvent liquid into contact with the top of the timber and down by gravity and diffusion through the resin ducts and other natural openings of the wood to dissolve and remove water and extractives from the wood; (3) replacing the charged solvent with fresh; (4) continuing until the moisture in the wood has been sufficiently reduced; and (5) removing the residual solvent by distillation.

33.37-8. Destructive Distillation. Charcoal and By-Products. Use of Wood and Charcoal for Gas Manufacture

See also *For. Abstr.* 12 (No. 442).

596. GILLET, A. **The future of wood pyrolysis.** [*Proceedings of the*] *Fourth Meeting of the* [*F.A.O.*] *Technical Committee on Wood Chemistry, Brussels* 1949 (4, 45–51 + 1 dgm., 5 gphs.). P.R.

Results of experiments on the pyrolysis of wood and pure cellulose are given in graphs. Empirical formulae for the products of pyrolysis are given.

597. FERNIE, N. **The Wundowie charcoal iron wood distillation project.** *Journal of the Institution of Engineers, Australia* 21 (1/2), 1949 (25–6). L.S.

Describes, with flow-sheet diagrams and graphs and tables of production, a plant which consists of a sawmill, a charcoal/iron blast furnace, a wood-distillation plant and a refinery.

598. PIATTI, L. **Liquid fuel from Bamboo.** *Schweizer Archiv für angewandte Wissenschaft und Technik, Solothurn* 13, 1947 (370–6). *Chem. Abstr.* 42 (9), 1948 (3153). O.R.S.

Describes the preparation and manufacture of a diesel fuel from Bamboo.

599. BENIČ, R. Prilog poznavanju tehnike pougljavanja i kvaliteta drvnog ugljena proizvedenog pougljavanjem na ubrzani način. [**Charcoal burning and the quality of charcoal produced by the fast method.**] *Šum. List* 73 (6/7), 1949 (220–32). [Croat.croat.russ.e.]

Trials by the Institute of Wood Technology, Zagreb University, with fast-burning, external-flue kilns (illustrated) gave the following results, as compared with ordinary kilns: (1) Burning time was reduced by one-third, and, with kilns of *ca.* 130 steres capacity, by two-thirds. (2) Yield was *ca.* 2% less. (3) The charcoal is of inferior chemical quality, 4% lower calorific value and, in consequence of numerous radial cracks, 16% lower in compression strength, rendering it useless for metallurgy. Data are derived from kilns producing 20 steres of charcoal.

33.39. Manufacture of Sugar, Oils, Alcohol, and Miscellaneous Chemical Products from Wood

See also *For. Abstr.* 12 (No. 595).

600. HARRIS, E. E. **Wood saccharification.** pp. 153–188 (154 refs.). In Pigman, W. W., and Wolfrom, M. L. [Editors], *Advances in Carbohydrate Chemistry*, Academic Press Inc., New York, Vol. 4, 1949. [Forest Products Laboratory, Madison.] L.S.

A comprehensive review of development and research, covering: the history of wood saccharification; the composition of wood as it influences hydrolysis; decomposition of the products of hydrolysis; the multistage process; pilot-plant experiments at Madison; the utilization of wood sugars; the hydrolysis of wood during sulphite pulping; and the production of alcohol from sulphite waste liquor.

601. VILLIÈRE, A. **The experimental hydrolytic plant at Sorgues in France.** [*Proceedings of the*] *Fourth Meeting of the* [*F.A.O.*] *Technical Committee on Wood Chemistry, Brussels* 1949 (4–5, 52–5). P.R.

602. HARRIS, E. E. **Food yeast production from wood-processing by-products.** *Rep. U.S. For. Prod. Lab., Madison* No. *D*1754, 1949. pp. 17 + 3 dgms., 1 gph., 13 tbls. 39 refs. P.R.

A review of literature.

33.4. *Converted Structural Timber*

See also *For. Abstr.* 12 (No. 666).

603. BOOTH, F. L. **Screen manufacture in the millwork plant.** *Wood-Worker, Indianap.* 69 (3), 1950 (26–7). P.R.

Describes the manufacture of window and door screens.

604. HEAD, A. E., and MACK, J. J. **Facts on flush doors.** *For. Prod. News Lett. C.S.I.R.O. Aust.* No. 178, 1949 (1–2).

The construction of flush doors is discussed, and results of experiments to illustrate the greater importance of the strength properties of the sheathing over those of the frame are tabulated. Other important factors are balanced construction, prevention of plywood sinkage by close spacing of rails and good

gluing technique, proper seasoning, and adequate ventilation of the inside of the construction.

605. Booth, F. L. **Producing curved laminated woodwork.** *Veneers & Plyw.* 44 (3), 1950 (12–3). P.R.

Discusses methods of manufacturing curved doorheads.

606. Kump, E. J. **Improvements in or relating to plywood arches.** *Brit. Patent* No. 624,875, June 17, 1949. pp.3 + 5 dgms. Price 2*s*. P.R.

Describes a structural plywood half-arch with a vertically extended leg portion, an inclined arch rib and a shoulder integrally joining the leg and rib. The half arch consists of a number of veneer elements of uniform thickness, glued together with their flat sides parallel to the plane of the arch.

607. Booth, F. L. **Laminated side wall and ceiling paneling.** *Veneers & Plyw.* 44 (4), 1950 (28–30). P.R.

Plywood wall panelling can be assembled at the factory, to exact measurements; the stiles, rails and tenons are as a rule framed together with mortise-and-tenon joints. A less expensive method is to erect the sheets of ¼- or ⅜-in. plywood stock in place and to produce the panelled effect by nailing or gluing thin vertical or horizontal framing strips over them; the appearance is improved by mitreing suitable mouldings round each panel. Laminated plywood stock is often profitably used instead of plaster for ceilings; larger-size panels are used so that joints can be kept to a minimum.

608. **Floor care pays off.** *Modern Materials Handling, Boston, Mass.* 5 (2), 1950 (18, 65–7). D.S.I.R.

Notes on the choice and maintenance of floors, including wood-block and board flooring, in industrial plants.

33.5. *Pitprops. Sleepers. Poles and Other Roughly Converted Wood*

See also *For. Abstr.* 12 (Nos. 583–7).

609. Dosmond, M. P. Le boisage par cadres. **[Timber frameworks.]** *Revue de l'Industrie Minérale, Saint-Étienne* No. 510, 1946 (211–29). [F.] L.S.

Deals with the theoretical and practical aspects of calculating the dimensions of mining timbers.

610. Müller, F. Massnahmen zur Ersparnis von Grubenholz. **[Methods of economizing in mine timbers.]** *Glückauf, Essen* 85 (23/24), 1949 (414–7). [G.] D.S.I.R.

The chief economy measures recommended are: the use of thinner, better-quality timber; the re-conditioning and re-use of old wood; and the substitution where possible of steel.

611. Bray, J. M. **Mine roof, treated timber and simple arithmetic.** *Mechanization, Washington, D.C.* 13 (10), 1949 (86–7, 90, 92, 111). D.S.I.R.

Lists some of the more durable species (e.g. Black Locust, Walnut, Chestnut and White Oak) used in mining, emphasizing that these species are less durable now that fast-grown trees, containing a large proportion of sapwood, are being used. Gives figures for the use of timber in the U.S. bituminous-coal industry and in the Pennsylvanian anthracite mines, and for the saving effected by using treated timber. Presents formulae for calculating the saving in an average coal or anthracite mine.

612. Griswold, N. B., and McKnight, J. S. **Wood use by Alabama mines.** *Occ. Pap. Sth. For. Exp. Sta.* No. 109, 1947. pp. 12.

613. Walters, C. S., and Kulp, D. A. **Hardwood requirements of the Illinois coal-mining industry for 1948.** Ill. agric. Exp. Sta. 1950. pp. 12. 3 refs.

614. **Modern crosstie testing.** *Timber of Canada* 10 (3), 1949 (29–32).

In the past, almost all service tests of railway sleepers were made primarily to evaluate the resistance to decay of various preservative treatments. Recently, however, several companies have begun to keep detailed records of the causes of removals. These include decay, shattering, spike killing, plate cutting, tamp killing, splits, defects in the wood, and removal because of track renewal. One company which has been keeping such records for 19 years is able to show that decay has declined, as a reason for removal, from 64·1% to 20%, while mechanical wear and splits have increased from 34·9 to 69·8%. Preservative treatment

has increased the average life of all sleepers from 5–8 years to 20–25 years.

A programme of research, sponsored by the Association of American Railroads and the National Lumber Manufacturers Association, is being caried out by the Research Laboratory of the Timber Engineering Co. Sleepers removed from the track are being analysed physically and chemically to determine the fundamental causes of deterioration, and new sleepers are being subjected to accelerated tests to evaluate their resistance to mechanical wear and splitting. These laboratory procedures have already produced results which service tests failed to do. For example, microscopic and macroscopic examination of old sleepers show that a 'pulping' action takes place under the metal bearing plate. This process is accelerated by the infiltration of sand etc. through the checks and splits. This finely ground wood is often mistaken for decayed wood, and the cause of removal of the affected sleeper is wrongly classified as decay beneath the bearing plate. Microscopic analysis with the aid of polarized light, shows that there is a deformation of the wood structure under the plate, caused by the load imposed by passing trains. This type of failure has been reproduced in the laboratory under repeated static loading with stresses comparable to those obtained under service conditions, and also under repeated loads in an accelerated sleeper-testing machine. Tests in this machine have also shown that bearing-plate movement is the basic cause of the metal plate's cutting into the sleeper. In this type of tests all variables are eliminated except those being tested. Under identical loading conditions, but with no appreciable plate movement in one case, and $\frac{3}{32}$-in. movement in the other, it was found that there was no plate cutting in the former, but cutting up to $\frac{21}{64}$ in. in the latter. It has also been shown that rust has an effect on the wood under the plate, causing a chemical change in the lignin/cellulose relationship compared with that found in normal wood. The effect (if any) of this on strength properties is now being determined.

33.6. *Packing Boxes, Crates, etc.*

See also *For. Abstr.* 12 (No. 588).

615. **Victorian box and case industry. Preliminary survey by Division of Timber Statistics and Programming, Forestry and Timber Bureau.** *Aust. Timb. J.* 15 (11), 1949 (793, 795, 797).

616. **New box end making machine permits greater use of Fir.** *Wooden Box & Crate, Washington, D.C.* 11 (4), 1949 (13–4). P.A.T.R.A.

The machine described is a piece of automatic equipment for inserting Pine splines into the side edges of built-up box ends made from 1, 2 or 3 pieces. The main advantage of spline ends is that they can be built up of White Fir material without danger of its splitting or cupping after the ends are resawn.

33.8. *Other Manufactured Products*

See also *For. Abstr.* 12 (Nos. 467–8).

617. **The 'Vampire' fuselage. A glued and pressurised wood shell for a jet propelled fighter aircraft.** *Wood* 15 (5), 1950 (151–6).

618. [SCANTLEBURY, G.] **[Timber in boat-building.]** *Timb. & Plyw.* 98 (2543), 1950 (534, 536). P.R.

At a meeting of the Wood Forum, the history and development of building wooden vessels, the classification of woods by durability for insurance, the choice of wood for yachts, wood preservation, and the use of laminated wood were discussed.

619. TOWERS, W. K. **The use of plywood in the building of boats.** *Veneers & Plyw.* 44 (3), 1950 (20, 22). P.R.

620. KUENZEL, J. G. **Wood requirements for shipbuilding.** *J. For.* 48 (4), 1950 (245–54).

Deals with wood for:—patterns, templets and models; stage and scaffold planking; keel blocks; decking, compreg floor bearers; fire-retardant treatment; stern tube and strut bearings; and small craft and rafts. There are tables showing the following:—(1) size, weight and strength of stage and scaffold plank; (2) wood-decking requirements of battleships, cruisers and aircraft carriers of different classes; (3) timber requirements for wooden naval vessels (submarine chasers, minesweepers etc.); (4) timber requirements for small boats.

621. **Ships' decking.** *Sel. Rep. Timb. Developm. Ass., Lond.* No. 11a, [1950]. pp. 13. P.R.

A detailed account of preliminary (2-year) service tests on 8 species [cf. *For. Abstr.* 11 (No. 2146)]. Their mechanical properties as compared with Teak are tabulated. Preliminary results (after 6 months) indicate that Kokrodua (*Afrormosia* sp.) has qualities closest to those of Teak, but goes black on exposure to decking conditions; attempts are being made to find the cause and remedy for this defect. Douglas Fir has been used extensively as a decking timber in place of Pitch Pine; it gives satisfactory results if quarter-sawn, but splits and wears badly if flat-sawn. Reports of the condition of decking from various species on merchant vessels are appended.

622. FREAS, A. D. **Don't test that ladder!** *Repr.* from *International Fire Fighter* October, 1949. pp. 2. 1 ref. P.R.

Strength tests made by manufacturers or fire departments set up compression stresses that may not be detected at the time but which weaken the ladder in service, and may cause sudden failures. A rigid specification excluding low-density material, and defects such as knots, cross grain, compression failures, decay and deep shakes or checks, is recommended; compression wood should be excluded, and the wood at time of manufacture should be as close as possible to the moisture content it will reach in service, probably about 10–12%. Frequent inspections for damage during service are desirable. [Cf. *For. Abstr.* 11 (No. 1138).]

33.9. *Grading [including Standard Specifications] and Storage of Converted Timber*

623. EDWARDS, J. P. **The Malayan grading rules.** *Malay. For.* 13 (1), 1950 (10–3 + 3 photos).

Notes on the reception of the rules by the trade, and the way in which they are working in practice. [Cf. *For. Abstr.* 11 (No. 1371).]

624. LOEHR, R. C. **Softwood lumber grading. 1. The history of lumber grading.** *Sth. Lumberm.* 180 (2258), 1950 (50, 51). 18 refs.

625. **Standard grading and dressing rules for Douglas Fir, Sitka Spruce, West Coast Hemlock and Western Red Cedar lumber.** West Coast Lumbermen's Association, Portland, Oregon. No. 14 (rev.), 1948. pp. 191. Price 25*c*. [Cf. *For. Abstr.* 4 (182).]

626. **Official grading rules for Hemlock and Tamarack lumber conforming to American lumber standards and White Cedar shingles.** Northern Hemlock and Hardwood Manufacturers Association, Oshkosh, Wisconsin. 1947. pp. 80.

627. **Standard grading rules for Northern White Pine, Norway Pine, Jack Pine, Eastern Spruce, Western White Spruce, Balsam, Tamarack, Aspen lumber.** Northern Pine Manufacturers' Association, Minneapolis, Minnesota. 1949. pp. 36.

628. **Standard grading rules for Southern Pine lumber.** Southern Pine Inspection Bureau, Southern Pine Association, New Orleans, La. 1948. pp. 124.

629. STERN, E. G., and BLAKE, O. J. **A study of structural Southern Pine.** *Timber News* 58 (2130; 2131), 1950 (157–60; 202–4). 4 refs. [Abstract of a thesis by O. J. Blake at the Virginia Polytechnic Institute.]

A shipment of 5,591 bd. ft. of dense, select, structural Southern Pine, commercially graded and inspected by the standard grading rules (based on annual rings per in. and proportion of sapwood), was found to contain 23 out of 317 planks (7·3%) that did not meet full grade requirements, judged by careful laboratory inspection of full cross-sectional specimens sawn from the middle of 16-ft. and the end of 8-ft. planks. This figure is 2·3% above the 5% considered a reasonable variation in judgment between graders and inspectors. However, the inclusion of 13 of the 23 planks might be justified because of their satisfactory specific gravity values. S.gr. of 136 samples sawn from a sapwood plank ranged from 0·553 to 0·601, average 0·567. The s.gr. of 315 planks tested ranged from 0·448 to 0·745, with an average of 0·581. This figure is 6·3% below that determined for material tested at Madison and the average strength values are therefore lower than was expected; these lower strengths have no appreciable effect on design data. The study indicates that the timber fulfils the expectation of the National Design Specification although some of the planks were

below grade. Results of the experiments are given in graphs and tables.

630. **Rules for the measurement and inspection of hardwood lumber, Cypress, veneers and thin lumber.** National Hardwood Lumber Association, 59 East Van Buren St., Chicago. 1950. pp. 102.

631. **Standard specifications for grades of Tidewater Red Cypress [*Taxodium distichum*]. Structural stress grades. Grade marks and rates of charges for inspection and reinspection service.** Southern Cypress Manufacturers' Association, Jacksonville, Florida. 1947. pp. 64. Price 25*c*.

632. **Australian standard grading rules for Jarrah [*Eucalyptus marginata*], Karri [*E. diversicolor*] and Wandoo [*E. redunca*].** *Aust. tech. Stand.* Nos. O.10–45, 1948. pp. 40. P.R.

The rules cover sleepers and cross-arms of Jarrah, Karri and Wandoo, poles of Jarrah and Wandoo, structural timber, mine guides and joinery stock of Jarrah and Karri, and railway crossing timbers, flooring, lining, weather boards and piles of Jarrah. Tables and graphs show permissible working stresses for Jarrah and Karri and 3 chemical tests (burning splinter test, alkalinity of the ash and an $FeCl_3$ test) for distinguishing the 2 species.

633. WALMARI, Z. Karihaaran lautatarhan suurpalo 30.9.49 ja sen seuraukset. [**The big fire at the Karihaara lumber yards on September 30th, 1949 and its consequences.**] *Pap. ja Puu* 32*B* (2), 1950 (37–50). [Fi.e.] [Finnish Sawmill Owners' Fire Insurance Company.] P.R.

The lay-out of the yard, the fire-fighting provision, weather, cause, outbreak and spread of the fire, fire-fighting work, and damage, are described in detail. Conclusions drawn are that big yards should be split up into small parts by broad clearance spaces, that the supply of water to stationary pumps and hydrants throughout the yard should be adequate, and that there should be a network of motor roads through the yard. The insurance companies and sawmilling industry have agreed that: (1) no yard containing more than 12,000 standards shall be covered as one risk; (2) minimum requirements, varying with the size of the yard, for the provision of fire pumps and an adequate water supply shall be fulfilled; and (3) wood-fired tugs shall not be allowed to come within 90 m. of the yard (the fire was caused by sparks from the funnel of a passing tug). Plans showing the new requirements are given. A fire in buildings containing stocks of dry sawn goods is described. Recommendations include a limitation in the size of sheds, spacing between sheds, the use of fireproof material, ventilation in the roof, and provision of fire-fighting equipment.

34. MINOR FOREST PRODUCTS AND THEIR UTILIZATION

34.2. *Vegetable Products*

See also *For. Abstr.* 12
(Nos. 193, 238, 240, 295).

34.24. Tanning Materials. Cork. Bark Products

See also *For. Abstr.* 12
(Nos. 234, 533, 637, 654).

634. KOLÁŘ, J. Zkoušky pěstování škumpy ocetné pro výrobu sumachového výtažku v Jugoslavii. [**Study of the production of *Rhus typhina* in Jugoslavia.**] *Technická Hlídka Koželužská, Brno* 24 (1), 1949 (6–8). [Cz.e.] S.L.T.C.

Along with data on tannin content of the leaves and of the extract, which are tabulated, the author notes that the seeds must be stimulated by soaking in hot saturated NaCl solution before sowing and that cuttings do better than seedlings.

635. **Wattle Research Institute, Report for 1949 (Second Year).** University of Natal, Pietermaritzburg, South Africa. 1950. pp. 43.

In addition to the annual report, includes the following papers:—'Possibilities for co-ordinated Wattle research in the African region' (*H. Shaw*); 'Report on possibilities for Wattle cultivation in Tanganyika and Nyasaland' (*S. P. Sherry*); 'The valuation of Wattle plantations for insurance' (*S. P. Sherry*); and 'Notes on the chemical control of the Wattle bagworm (*Acanthopsyche junodi* Hegl.), 1949–50' (*I. L. J. Ossowski*).

636. ROBERTSON, W. A. **Note on a visit to the Station des Recherches et Experimentations forestières at Rabat.** *Emp. For. Rev.* 29 (2), 1950 (136–8 + 8 photos).

Deals mainly with the plantations of various Eucalypts in Morocco [cf. *For. Abstr.* 9 (No. 902)], with particular reference to production of tanstuffs. Analysis of specimens of Moroccan *Eucalyptus sideroxylon* [? bark], 15–17 years old, gave tannin contents (water extract) varying from 29·00 to 42·05%, compared with 34·7–47·2% for Australian-grown material (but this may have been from older trees). The extract gives a rather soft leather of a dark colour, but should do well if mixed with Chestnut extract. Trees 14 years old have a mean height of 50 ft. and d.b.h. 8 in., and yield 80 kg. green bark.

Scattered notes are also given on the use of *Chamaerops* and *Rhus pentaphylla* for soil fixation, and on the indigenous Cedar forests.

34.25. Medicinal and Edible Plants

See also *For. Abstr.* 12 (No. 193).

637. BHATTACHARJI, S., MITRA, C., and SIDDIQUI, S. **A note on the chemical examination of Nim (*Melia azadirachta*) trunk-bark.** *J. sci. industr. Res., India* 8*B* (10), 1949 (188). 4 refs. D.S.I.R.

638. BHATTACHARJI, S., MITRA, C., and SIDDIQUI, S. **A note on the chemical examination of Nim (*Melia azadirachta*) exudate.** *J. sci. industr. Res., India* 8*B* (10), 1949 (187). 6 refs. D.S.I.R.

639. CHEVALIER, A. La question des *Strophanthus* à glucosides. **[The question of *Strophanthus* species containing glucosides.]** *Rev. int. Bot. appl. Agric. trop.* 30 (327/9), 1950 (1–15). 16 refs. [F.] P.R.

Discusses the distribution, properties and chemistry of *Strophanthus* spp., and the possibility of cultivating them for the production of cortisone. [Cf. *For. Abstr.* 12 (No. 188).]

640. PARIS, R., and MOYSE-MIGNON, H. Pouvoir antimicrobien et présence de plumbagol chez deux *Diospyros* africains (*D. xanthochlamys* Gürke et *D. mespiliformis* Hochst.). **[The antibacterial effect and the presence of plumbagol in two African *Diospyros* species.]** *C.R. Acad. Sci., Paris* 228 (26), 1949 (2063–4). [F.] D.S.I.R.

641. GALINOVSKY, F., GOLDBERGER, H., and PÖHM, M. Über das Laburnin, ein Alkaloid aus *Cytisus laburnum.* **[Laburnine, an alkaloid from Laburnum.]** *Monatshefte für Chemie, Wien* 80 (4), 1949 (550–4). 11 refs. [G.g.] BM.U.

A new alkaloid for which the name laburnine is proposed has been isolated from the lower-boiling alkaloid fraction of *C. laburnum* [*Laburnum anagyroides*] in quantities of 1·5%.

642. DUVIGNEAUD, P. Les variétés congolaises de *Strychnos holstii* Gilg. et leurs alcaloïdes. **[The Congo varieties of *S. holstii* and their alkaloids.]** *Bulletin des Séances de l'Institut Royal Colonial Belge, Brussels* 20 (2), 1949 (584–92). [F.] L.S.

[Cf. *For. Abstr.* 12 (No. 197).]

643. BOSLY, J. Étude chimique des alcaloïdes du *Strychnos holstii* Gilg. **[Chemical study of the alkaloids of *S. holstii*.]** *Bulletin des Séances de l'Institut Royal Colonial Belge, Brussels* 20 (2), 1949 (593–5). [F.] L.S.

644. KING, H. **Curare alkaloids. Part X. Some alkaloids of *Strychnos toxifera* Rob. Schomb.** *Journal of the Chemical Society, London* Dec., 1949 (3263–71). [National Institute for Medical Research, Hampstead, N.W.3.] O.R.S.

645. LAHEY, F. N., and THOMAS, W. C. **Alkaloids of the Australian Rutaceae: *Acronychia baueri*. I. The isolation of the alkaloids.** *Aust. J. sci. Res.* 2*A* (3), 1949 (423–6). 2 refs. P.R.

646. HUGHES, G. K., and NEILL, K. G. **Alkaloids of the Australian Rutaceae: *Evodia xanthoxyloides*. I. Evoxanthine.** *Aust. J. sci. Res.* 2*A* (3), 1949 (429–36). 5 refs. P.R.

647. RIKOVSKI, I. I., and BESARIĆ, R. Ispitivanje domaćih plodova u pogledu sadržaja vitamina 'C'. **[Research on the vitamin C content of some indigenous fruits.]** *Glasnik Hemiskog Društva, Beograd* 13 (3/4), 1948 (211–8). 6 refs. [Serb.e.] [Chemical Laboratory of the Faculty of Agriculture and Forestry, University of Belgrade.] L.S.

Fruits of *Solanum melogena*, *Crataegus oxyacantha*, *Lycium vulgare* and *Prunus spinosa* were found to contain small quantities of vitamin C, up to 0·1 mg. per g. of fruit. Fruits of *Elaeagnus angustifolia* and *Ceratonia siliqua* contained respectively 0·33 and 0·2 mg./g. and might in the absence of other fruits be used as a source of vitamin C. *From authors' summary.*

34.26. Resin. Turpentine. Oils. Gums

See also *For. Abstr.* 12 (Nos. 231, 235).

648. Hajšel, J. Pokusná ťažba živice v borovicových porastoch na Slovensku a jej výhliadky do budúcna. **[Experimental resin-tapping in Pine stands in Slovakia and its future prospects.]** *Pol'ana* 3 (9/10), 1947 (193–8). [Slovak.]

Extracts from a forthcoming publication of the Institute of Logging and Mechanical and Chemical Wood Technology (*Výskumný ústav lesnej ťažby, mechanickej a chemickej technologie dreva*), Banská Štiavnica.

649. Radosavljević, S. D., and Dudić, M. M. Uticaj smeše magneziumhlorida, odnosno kalciumhlorida sa hlorovodoničnom kiselinom na lučenje balsama crnoga bora. **[The effect of a mixture of $MgCl_2$ or $CaCl_2$ and HCl on the resin flow of *Pinus nigra*].** *Glasnik Hemiskog Društva, Beograd* 13 (3/4), 1948 (219–44). 3 refs. [Serb.g.] [Chemisch-technisches Institut der techn. Fakultät der Universität Beograd.] L.S.

Solutions of 10 l. of 25% HCl mixed with 1 kg. MgO or with 1·19 kg. CaO were sprayed by atomizer on the freshenings of 2,000 trees, tapped by the French, German and Austrian methods; periodicity of freshening and collection was identical. Results, which are tabulated in detail, showed an increase in yield over the use of HCl alone; with the $CaCl_2$ mixture, yields were 20% higher.

650. Pejoski, B. Prilog poznavanju makedonskih borovih smola. **[A contribution to the knowledge of the Pine resins of Macedonia.]** *Šum. List* 73 (8/9), 1949 (257–69). [Serb.russ.e.]

Data of rosin and turpentine recovery from *Pinus nigra*, *P. halepensis* and *P. peuce* for various years, localities and methods of tapping, together with a more detailed, graphical analysis for 85 distillations of *P. nigra* resin at the Kapina factory in 1948. A detailed physico-chemical analysis of *P. nigra* resin, tapped by the main methods, is tabulated from data obtained at the Technical Institute, Belgrade in 1936. Measures for increasing the turpentine yield and reducing impurities are proposed.

651. Pejoski, B. O filtrovanju borovih smola. **[The filtration of Pine resin.]** *Šum. List* 72 (1/2), 1949 (42–5). 5 refs. [Croat. russ.e.]

In view of the difficulty of procuring Canada balsam, the Institute of Histology and Embryology, Zagreb, investigated the possibilities of purifying local resins. Four species of *Pinus*—*P. halepensis*, *peuce*, *nigra* and *leucodermis*—were tried and a system of successive filtrations (described in detail) was evolved which yielded a satisfactory product. After a preliminary 12–15 days in an air-tight canister, topped up with extra turpentine, the more solid and crystallized portion of the resin settles at the bottom and, along with any sediment, can be separated and thrown away. The rest is strained, first through lint (removing the grosser organic impurities, e.g. needles, shavings, *ca.* 6–8% of the total weight), then, after 15–20 days for settling and separating secondary impurities, through linen, and finally through baize. The filtrate so obtained consists of highly purified oleo-resin suitable for microscopic work and dilutable to the density required. That from *P. peuce* was pale yellow and represented 30–40% by weight of the raw product; that from *P. nigra* was yellow to brown and represented 20–30% of the raw product. Higher percentages may be possible with better and quicker methods of collection; the high evaporation rate of the terpenes in *P. halepensis* resin, however, renders it less suitable for filtration. The properties of the *P. nigra* filtrate are being investigated.

652. Inouye, Y., Nakamura, T., and Nishimoto, K. **Studies on the wood preservatives. (2) Dry distillation of Pine resin when activated clay is used as a catalyst.** *Wood Res., Kyoto* No. 4, 1950 (24–44). 6 refs. [Jap.e.]

Resin from Akamatsu (*Pinus densiflora*) and Kuromatsu (*P. thunbergii*) was distilled with

and without acid clay as a catalyst. The relations between the temperature and duration of the process and the quantities of distilled oil and water are tabulated. The properties of distillates obtained with a catalyst are completely different from those obtained without. Resin distilled at 200° C. yielded a considerable quantity of distillates and gases; at 300° the yield of distillates was large and that of gases small. There was considerable variation in the results even when the experiments were carried out in the same conditions. *From authors' summary.*

653. MEGHA, G. Prezzo di macchiatico della resina delle pinete silane (1945–1948). **[Value of unextracted resin in the Pine woods of the Sila plateau [, Calabria], 1945–8.]** *Ital. for. mont.* 5 (1), 1950 (22–5). [It.f.e.]

Prices and production costs of resin from Corsican Pine in Calabria have been calculated for the 4-year period 1945–8, for several stands situated at the same distances from the main road (6 km.) and the railway (25 km.). The value of the resin in the tree (i.e. before extraction) was determined by deducting the cost of extraction plus transport charges from the selling price of the crude product free on rail. The values calculated for the first 3 years of the period were 2,061, 3,230, and 3,707 lire/100 kg. respectively, but in the last year, as a result of falling prices and rising costs, the value worked out at – 250 lire.

654. HANZAWA, M. **The bark oil of Fir [*Abies sachalinensis*] (Part I). The nature of the volatile fractions.** *Res. Bull. exp. For. Hokkaido Univ.* 14 (1), 1948 (139–43). [Jap.]

655. BRIGGS, L. H., CAWLEY, W., LOE, J. A., and TAYLOR, W. I. **Diterpenes: Part III. The diterpenes from *Podocarpus ferrugineus*.** *Journal of the Chemical Society, London* March, 1950 (955–8). [Auckland University College, Auckland, New Zealand.] O.R.S.

656. BRIGGS, L. H., and LOE, J. A. **Diterpenes: Part IV. The isolation of phyllocladene from the essential oil of *Podocarpus spicatus* grown in the North Island of New Zealand.** *Journal of the Chemical Society, London* March, 1950 (958–9). [Auckland University College, Auckland, New Zealand.] O.R.S.

34.27. Seeds. Fruits. Leaf Fodder

See also *For. Abstr.* 12 (Nos. 94, 647).

657. STEYN, D. G. **The toxicity of various species of *Eucalyptus* trees (Blue Gum, 'Blougom', 'Bloekom').** *Journal, South African Veterinary Medical Association, Pretoria* 19 (1), 1948 (25–9). 6 refs. W.A.H.

No HCN was found in the leaves of *Eucalyptus lindleyana* and *E. sideroxylon* but quantities toxic to sheep were found in leaves of *E. cladocalyx*. Leaves of *E. sideroxylon* were found to be poisonous to sheep and the toxicity appears to be due to the eucalyptol present in the leaves; leaves of *E. cladocalyx* caused fatal hydrocyanic poisoning in sheep. Methods of treating and preventing *Eucalyptus* poisoning are described.

34.28. Bamboos. Osiers

See *For. Abstr.* 12 (Nos. 108, 206, 301, 382, 402, 517, 575, 598).

34.3. *Products of the Animal Kingdom*

See also *For. Abstr.* 12 (No. 891).

658. MÜLLER-USING, D. Jagdwirtschaft. **[Management for hunting and shooting.]** *Z. Weltforstw.* 12 (4/6), 1948 (90–5). [G.e.f.]

Discusses the licensing systems in different countries and gives figures for the distribution of game and fur-bearing animals in European countries.

659. GRIVAZ, F. Forêts, chasse et pêche. **[Forests, hunting, shooting, and fishing.]** *Schweiz. Z. Forstw.* 101 (5), 1950 (192–209). [F.g.]

With reference to conditions in the canton of Vaud.

35. SALE AND DISPOSAL OF FOREST PRODUCTS. TIMBER TRADE

660. **Monthly Digest of Statistics, No. 49, 1950. pp. v + 135. With supplement: definitions and explanatory notes, revised Jan., 1950.** pp. 61. H.M. Stationery Office, London.

Cf. *For. Abstr.* 8 (No. 1360).

661. MacGregor, J. J. **The trend of prices and volume of imported timber.** *J. Land Agents' Soc.* 49 (6), 1950 (241–6).

An attempt is made to show over a limited period (1914–49) the movements for imported c.i.f. prices of some of the categories shown in Board of Trade returns. Tables give total volume and unit value respectively of timber imported, by categories.

662. Valtasaari, M. Suomen metsäteollisuuden vientiorganisatiosta. [**On the export organization of the Finnish woodworking industry.**] *Metsät. Aikak.* 1949 (6/7), (209–10; 225, 229). [E.Fi.]

663. Horn, A. G. **Commodity drain from forests of the Lake States 1948.** *Sta. Pap. Lake St. For. Exp. Sta.* No. 20, 1950. pp. 35.

664. Gualberto, V. A economia madeireira e o Instituto Nacional do Pinho. [**Timber economy and the National Pine Institute.**] *An. bras. Econ. flor., Inst. nac. Pinho* 1 (1), 1948 (11–27). [Port.] P.R.

Considers the position of Brazil in the world timber situation and outlines the objectives of the 'Instituto Nacional do Pinho' and its present policy in the spheres of domestic timber production, grading, transport, forest conservation and afforestation.

38. CONSTRUCTIONAL WORKS: ENGINEERING

38.2. *Building Construction. Foundations and Superstructures*

665. Sallenave, P. Maisons tropicales en bois. [**Tropical wooden houses.**] *Bois For. Trop.* No. 13, 1950 (53–61). [F.e.span.]

Briefly reviews wooden house construction in Indonesia, Indo-China, Siam, and Malaya and deduces rules for structures in tropical climates which shall be termite-proof, a protection from excessive heat and light, well ventilated, and durable.

666. Langlands, I., and Thomas, A. J. **Handbook of structural timber design.** *Tech. Pap. For. Prod. Aust.* No. 32 (3rd ed.), 1948. pp. 299. P.R.

Contains sections on design, specification and inspection of large timber structures, principal factors affecting the strength of wood, structural grading rules, properties of structural timber, selection of species, working stresses, design methods, and permissible loads on joists, beams, struts, posts and columns; also tables giving figures for properties of structural timbers used in Australia, basic working stresses, design of bolted joints, data for split-ring, shear-plate and bolted-ring connectors, properties of timber sections, permissible loads for joists, beams, struts, posts and columns and dead and live loads.

38.3. *Road and Bridge Construction*

667. Martini, M. de. Strade per monti e boschi. [**Mountain and forest roads.**] *Monti e Boschi* No. 2, 1950 (74–9). [It.]

Gives some account of recent road construction in Italy with a comparison of present costs of transporting 1 cu.m. of wood (*a*) by cableway (1,000 lire/km.) and (*b*) by road (775 lire/km.), taking into account capital expenditure, maintenance etc., but not the much greater capacity and general utility of the road.

668. McCraw, W. E. **Road building equipment and cost analysis.** *Timberman* 51 (7), 1950 (68, 70, 72). [Also in *Sth. Lumberm.* 180 (2253), 1950 (74–6).]

Comparative cost studies on the operation of various types of construction equipment used in building logging roads. Studies are based on use of 'Caterpillar' equipment and may be applied to other equipment of similar class and weight. *Author's summary.*

669. Putkisto, K., and Arnkil, J. E. Hevosvarsiteiden hoitokalustosta ja hoidosta. [**On equipment for the maintenance of main roads for horse haulage and on their maintenance.**] *Julk., Metsäteho, Helsinki* No. 15, 1948. pp. 69 + 54. 5 refs. [Fi.e.]

Describes the construction and considers the performance of snow ploughs used for opening and maintaining roads for horse haulage, scraper models for cutting ruts on iced roads, and cold- and hot-water sprinklers for watering roads, and describes different methods of organizing road-building work.

4. FOREST INJURIES AND PROTECTION

670. SCHWERDTFEGER, F. Grundriss der Forstpathologie. [**An outline of forest pathology.**] Paul Parey, Berlin & Hamburg. 1950. pp. 197. 7 refs. [G.]

Forest pathology, as here understood, includes injuries of all kinds—not only diseases but also physiological disorders, damage by man, injuries due to insect pests, weeds, etc. The work is a condensed version of the author's *Die Waldkrankheiten*, 1944, and is divided into three parts: (1) Diseases and injuries classified according to their cause, those due to biological agencies being subdivided in the first place into injuries to seedlings etc., to young plantations, to individual tree species, to wood, and to seeds. (2) The requisite conditions for attack, the course and the effects of diseases etc. (3) Preventive and control measures, including a section on the prognosis of mass attacks with chief reference to insects. A combined species and subject index is provided.

671. DAMPF, A. La importancia de la entomología y de la fitopatología forestales para la protección de nuestros bosques. [**The importance of forest entomology and phytopathology for the protection of our forests.**] *Bol. Direcc. for. Caza, Méx.* Jan./Dec., 1949 (35–45). 41 refs. [Span.]

A review of Mexican publications on the subject, with bibliography.

41. TECHNIQUE OF FOREST PROTECTION

See also *For. Abstr.* 12 (No. 324).

672. FURLANI, S. Il gruppo a motore Furlani per trattamenti di vario genere con sostanze liquide, solide e gasose (brevetto Furlani). [**The Furlani motor unit for various treatments using liquid, solid, and gaseous substances (Furlani patent).**] *Boll. Staz. For. Trieste* No. 1, 1947 (81–101 + 5 photos). [It.it.e.f.g.]

This apparatus is suitable for use for a wide range of treatments (spraying, dusting etc.) and preparations (solutions, suspensions, emulsions, aerosols and dusts), even if dangerous to men or injurious to certain materials. It consists of a four-handled stretcher of metal tubing on which is mounted a motor compressor (2½ h.p., 3,000 rev./min., air cooled) weighing 23 kg. The motor uses about 2½ l. of benzene an hour and about 120 g. of lubricant per litre of benzene. Connected with the compressor is a cylindrical tank of sheet metal, thick enough to resist a pressure of 6–7 atm. (capacity 35 l.) with pressure gauge, safety valve, and outlet. In it are incorporated devices for stirring and heating, and attached is a collector tube, furnished with cocks to which one or more flexible hose pipes (10–15 m. long) of resistant material can easily be connected. Each hose-line is attached to a rigid tube, 9–10 m. long, by a valve worked by a lever. Different nozzles can be attached to the end of the tube. Details are given of the cost of constructing an experimental model with 5 tubes 10 m. long and all accessories (70,000–90,000 lire, of which 60% represents the cost of the various movable parts). The model, with accessories for 5 men to work at once, weighed 65 kg. Some account is given of operations against the nests of Pine processionary caterpillars. [Cf. *For. Abstr.* 12 (No. 767).]

673. POTTS, S. F. **Construction of mist blower equipment.** *Trees, Cleveland, Ohio* 9; 10 (6; 1), 1949 (17; 7).

674. TIRRELL, G. E. **Mist spray coverage and control.** *Trees, Cleveland, Ohio* 10 (3), 1950 (10–1, 16–7).

Theory and practice of operating a mist sprayer.

42. INJURIES FROM INORGANIC AGENCIES, EXCLUDING FIRE

See also *For. Abstr.* 12 (Nos. 70–1, 717).

42.1. *Air Currents*

See also *For. Abstr.* 12 (No. 248).

675. FAUST, H. Untersuchungen von Forstschäden hinsichtlich der Windstruktur bei einer Bö. [**Investigations into forest damage in relation to the wind structure of a storm.**] *Meteorologische Rundschau, Berlin* 1 (9/10), 1948 (290–7). 3 refs. [G.g.] L.M.O.

Study of a storm that occurred in the Darmstadt-Frankfurt area in July 1941, the

direction and velocity of wind currents, and the resultant damage to the forests. Curves are presented illustrating wind resistance, according to age class, of Pine, Oak, Beech and Spruce.

42.2. *Temperature Influences*

See also *For. Abstr.* 12 (Nos. 277, 298).

676. Žabka, J. Biologické a pěstitelské poznatky vyplývající z mrazového poškození lesních dřevin v období 1928–1940, zejména však za zimy 1939–40. [**Biological and silvicultural observations with regard to frost damage to forest trees in the period 1928–40, especially during the winter of 1939–40.**] *Zpr. výzkum. Úst. lesn. ČSR* No. 2, 1948 (181–95). [Cz.russ.e.] [Ústav pěstění lesů a les. biologie, Brno.]

Extensive frost damage to forest trees in Bohemia and Moravia in the winter of 1939–40 is analysed by species. Its severity is attributed chiefly to the physiological condition of the trees, which had been kept in growth by a wet autumn and in many instances had shoots that were still sappy and 'unripe' when the frosts came. There was consequently much damage to foliage, buds and shoots, in contrast to the 1928–29 frosts, which followed a dry autumn during which the shoots 'ripened' before the frosts.

Physiological frost damage in 1939–40 was most pronounced in the case of shadebearing and half-shadebearing species such as Silver Fir, Ash, Beech, and Norway Spruce. A surprising degree of damage was noted for Lime, which escaped in 1928–29. Hornbeam suffered only in a few cases. Scots Pine, Larch, Oak, Elm, Alder, Aspen, Poplar and Maples mostly escaped physiological damage, but technical damage in the form of frost cracks occurred, chiefly in Oak and Ash. Among exotic species serious damage was done to *Robinia pseudoacacia* and rather serious to *Juglans nigra* and *J. regia*.

As regards external conditions conducive to frost damage it is noted that the worst damage occurred: (1) On S.E., S. and S.W. aspects and places exposed to freezing winds. (2) To trees of the lowest age classes, especially where suddenly released from overhead cover, and also in plantations on clear-felled areas and in nurseries unprotected by snow. Less damage occurred in polewoods and very little in mature stands. (3) In over-thinned stands and where stand density had been reduced by windthrow. (4) In coppice forest and to standards in coppice-with-standards.

677. Day, W. R. **Frost as a cause of die-back and canker of Japanese Larch.** *Quart. J. For.* 44 (2), 1950 (78–82). 8 refs.

[Cf. *For. Abstr.* 10 (Nos. 662–3).] Cases are described of serious frost injury which have resulted in a dying-back of the crown in some cases, and canker on the main stem in others, in Japanese Larch plantations. The aspect of both types of disease is different from that of the equivalent types which appear in European Larch: firstly, the cankers have developed on the main stem after canopy has been formed, instead of being initiated while the stem or branch is still small, as is ordinarily the case with European Larch; secondly, the die-back takes place from the ends of branches and usually from the top of the tree and not, as in European Larch, from the base of the tree upwards and as a result of the girdling of the branches by injuries which occur at some distance from the tip, the outer part of the branch dying, not from frost injury but from the girdling. These two aspects of die-back arise because spring frost is the main factor acting in the case of European Larch and autumn frost in the case of Japanese Larch. *Author's summary.*

42.5. *Chemical Influences. Nutrient Deficiencies*

678. Němec, A. Biochemická a pedologické studie k otázce příčin krnění borových porostů v polesí Želechy u Lomnice nad Pop. [**A biochemical and pedological study of the causes of growth stagnation of Scots Pine stands in the Želechy forest district, near Lommice nad Pop.**] *Zpr. výzkum. Úst. lesn. ČSR* No. 2, 1948 (53–75). 12 refs. [Cz. russ.e.] [Ústav lesní biochemie a pedologie, Prague.]

Pine plantations on areas clear-felled some 25 years ago after devastation of Spruce stands by nun moth, throve for their first 8 years but then began to stagnate and die out. The author's soil investigations showed that deficient soil moisture during droughts and poor aeration in the lower horizons had contributed to this result, but the chief cause was soil

degradation. Acidification, Ca deficiency and a high content of readily soluble toxic Al compounds, characterized the upper horizons to which the root systems were confined, though lime occurred in the lower horizon which they could not reach. As Pine counteracts the toxic effects of Al compounds by increasing its Ca uptake, and as, in the absence of sufficient Ca in the soil, it is taken from the bark and possibly from the stemwood and branches, nutritional disturbances occur. Studies of soils bearing healthy Pine in the same neighbourhood showed that here the Ca content was much higher and the content of soluble Al compounds much lower than in the checked stands. A 5- to 10-year-old Pine plantation that had proved susceptible to late frost was found to be suffering in addition from K deficiency.

Remedial measures recommended for the checked stands in this area are liming, use of K fertilizers where necesssary, and intercultivation with *Lupinus polyphyllus* to improve the N status of the soil. [Cf. *For. Abstr.* 9 (Nos. 1438, 1863–5; 10 (No. 1729).]

679. Iljin, W. S. Der Stoffwechsel des Stickstoffs bei der Kalkchlorose der Pflanzen. **[Nitrogen metabolism in calcium chlorosis of plants.]** *Jahrbücher für wissenschaftliche Botanik, Bonn* 91 (3), 1944 (404–38). [G.g.] O.B.D.

A study of the N contents and chemical changes in leaves of diseased plants of 6 species, including *Sambucus nigra*, *Fraxinus excelsior* and *Syringa vulgaris*.

43. FOREST FIRES

680. Beall, H. W., and Lowe, C. J. **Forest fires in New Brunswick 1938–1946.** *For.-Fire Res. Note For. Br. Can.* No. 15, 1950. pp. 35.

A statistical study.

681. [Fordham, J. H., Williams, E. J. C., and Lawson, D. I.] **Those forest fires.** *Fire Prot. Lond.* 13 (114), 1950 (167–8, 183). P.R.

Reports by 3 English fire officials on the fires in the Landes in 1949, on the possibility of large-scale forest fires in Great Britain and on methods of prevention and control.

682. Circulation des véhicules tracteurs en forêt, **[Movement of tractors in the forest.]** *Bois & Résin.* 32 (1525), 1950 (1). [F.]

A decree issued 6.4.50 by the Prefect of the Gironde, regulates the use of tractors in the Landes forests. Gas-producer vehicles are prohibited on forest roads less than 3·5 m. wide and not surfaced with stone or white sand, from 1 March to 31 October. At other times and on other roads, such vehicles may be used if provided with specified spark-arresters, insulation of any part likely to become dangerously hot, an 8-l. foam fire-extinguisher, a 50-l. water tank which must be kept full, and two sprinklers. They are liable to periodic inspection, and the furnace must not be raked out in the forest. Similar regulations about extinguishers etc. are made for oil- and petrol-burning vehicles.

43.0. *Predisposing Factors and Causes*

683. Gatheron, J.-M., and Lavoine, J. Les incendies de forêts dans les landes de Gascogne en 1949. **[Forest fires in the Landes in 1949 [—with discussion].]** *C.R. Acad. Agric. France* 36 (3), 1950 (124–34). [F.] A.P.B.

Presents data on the occurrence of fires and the relative humidity and draws the general conclusion that fires become frequent and dangerous in this region as soon as the relative humidity falls below 35.

684. Cromer, D. A. N. **Fire weather forecasting in Australia.** *Aust. Timb. J.* 15 (11), 1949 (799, 801–2). 8 refs.

A brief account of progress and current practices.

685. Jemison, G. M., Lindenmuth, A. W., and Keetch, J. J. **Forest fire-danger measurement in the Eastern United States.** *Agric. Handb. U.S. For. Serv.* No. 1, 1949. pp. 68. 24 refs.

Principles of measurement, application of fire-danger ratings, the operation of a measuring system, and equipment used in measurement.

686. Bruce, M. B. **Stream flow as a means of forecasting periods of extreme burning conditions.** *Fire Control Notes* 11 (2), 1950 (24–5).

Monthly stream-flow data for the White Mountain National Forest for 1937–47 were

obtained from the U.S. Geological Survey, and plus or minus departures from monthly normals were plotted to a convenient scale. It was found that the peak of increasing deficiencies in stream flow, easily apparent on the graph, coincided with known periods of extreme fire hazard. A graph in somewhat similar form has been kept plotted since 1947 as a means of forecasting the possibility of unusually extreme forest fire hazard, and as a supplement to the standard fire-danger meters.

43.1. *Protective Measures (including Controlled Burning)*

See also *For. Abstr.* 12 (Nos. 251–2, 254, 261, 694).

687. THOMPSON, P. A. **Principles of organizing for forest fire suppression.** U.S. For. Serv. 1948. pp. 25 + xxiv.
Cf. *For. Abstr.* 8 (No. 673).

688. THOMPSON, P. A. **Forest fire control—1949.** *J. For.* 48 (4), 1950 (241–4).
A review of recent progress in the U.S.A.

689. CHAMPION, H. G. **Fire protection in the North American West Coast forests.** *Emp. For. Rev.* 29 (1), 1950 (36–9).

690. FONS, W. L., and MCBRIDE, R. S. **Wet water for pretreating litter fuels.** *Fire Control Notes* 11 (2), 1950 (26–7).
Experiments were made on two types of forest fuel (Ponderosa and Lodgepole Pine needles, and Ponderosa Pine twigs) to determine the relative rates of evaporation from material wetted with ordinary and with 'wet' water. For needle litter the evaporation during the first 20 minutes was greater with 'wet' than with plain water, but after 20 minutes this trend was reversed and the greatest evaporation occurred from needles treated with plain water. For twigs, however, 'wet' water is more effective throughout.

43.3. *Fire Damage*

See also *For. Abstr.* 12 (No. 86).

691. WOODS, J. B. **The rehabilitation of the Tillamook Burn.** *J. For.* 48 (5), 1950 (362–4).
Recapitulates the history of the fires which resulted in the devastation of 311,000 acres of forest, and reviews the measures taken to finance research into and application of large-scale methods of reforestation.

44. DAMAGE BY HARMFUL PLANTS. VIRUS DISEASES

692. GÄUMANN, E. **Principles of plant infection. A text-book of general plant pathology for biologists, agriculturists, foresters and plant breeders.** Crosby Lockwood & Son, Ltd., London. 1950. pp. xvi + 543. 11 pages of refs. Price £3. 3*s*.
The authorized English edition, translated by W. B. Brierley. [Cf. *For. Abstr.* 8 (No. 2091).]

693. BONNER, J. **The role of toxic substances in the interactions of higher plants.** *Bot. Rev.* 16 (1), 1950 (51–65). 41 refs.
Discusses and reviews investigations into the theory that toxic substances are produced by higher plants, and passing to the soil, may affect the growth of the same or associated species. In the case of *Encelia farinosa* and *Artemisia absinthium* there is definite evidence that the leaves contain toxic substances which affect the growth of other plants. Roots of *Robinia pseudoacacia* and Black Walnut [*Juglans nigra*] contain growth-inhibiting substances, but their effect on the soil and on other plants is not yet determined. Guayule [*Parthenium argentatum*] produces toxic substances, but these are rapidly destroyed by the soil. [Cf. *For. Abstr.* 11 (No. 3260).]

44.0 *Climbers and Epiphytes*

See *For. Abstr.* 12 (No. 365).

44.1 *Forest Weeds*

See also *For. Abstr.* 12 (Nos. 304, 313–5).

694. CHAIKEN, L. E. **The behaviour and control of understory hardwoods in Loblolly Pine stands.** *Tech. Note Stheast. For. Exp. Sta.* No. 72, 1949. pp. 27. 10 refs.
Summarizes the present state of knowledge and suggests methods of control by (1) use of fire, (2) chemicals, and (3) methods of manipulating canopy.

695. SOUTHWICK, L. **Control of weeds and brush along rights-of-way, with new**

herbicides. *Agricultural Chemicals, Baltimore, Md.* 4 (7), 1949 (21–5, 67). O.R.E.

Some practical recommendations based on the results of extensive spraying operations in 1948.

696. PIENAAR, A. J. **The American Bramble, a menace to pastures. Control with chemical weed-killers.** *Fmg. S. Afr.* 25 (288), 1950 (79–81). 8 refs. [College of Agriculture, Cedara, Natal.] E.M.B.

Describes methods of destroying *Rubus fruticosus*, which has now spread over almost all the high-rainfall area of Natal, and is a menace to pastures and young plantations. The most effective weedkiller proved to be ammonium sulphamate. One application of a 10% water solution was sufficient when applied at a rate of 320–390 gal. per acre. Spraying should be done when the plants have made the maximum upper growth for the season, and is better when done in the morning. If the plants grow again, another application should be made in the following year as soon as a fair amount of upper growth has been made. An ordinary 50 lb./sq. in. pressure pump was suitable for small operations. Ammonium sulphamate is harmful to all vegetation, so care must be taken not to injure plants of value.

697. WURGLER, W. La sensibilité de quelques arbres et arbustes envers les acides phénoxyacétiques. **[Susceptibility of some trees and shrubs to damage by phenoxyacetic acids.]** *Revue Horticole Suisse, Geneva* 21 (8), 1948 (221–6). 5 refs. [F.] E.M.B.

An 0·2% aqueous solution of 2,4-D was applied as a spray to the aerial parts of 63 woody species at various seasons of the year, and the effects were observed and recorded. Only five of the species (4 conifers and *Fagus sylvatica*) were not affected in any way at any season of the year. Effects on the other species were generally most severe in spring, and, in many cases, lasted into the following year. The experiments show that precautions must be taken when using this weedkiller in the neighbourhood of woody plants.

698. WURGLER, W. Observations sur le transport de l'acide 2,4-dichlorophénoxyacétique dans les plantes ligneuses. **[The movement of 2,4-D in woody plants.]** *Revue Horticole Suisse, Geneva* 21 (9), 1948 (239–42). 5 refs. [F.f.]

The acid was applied in lanolin at various concentrations to twigs and shoots of *Prunus armeniaca, P. insititia* and *Rosa dumetorum.* It was observed that the acid circulated more rapidly towards the apex of the organ that had absorbed it than towards the base, and caused deformation and mottling in the new leaves of terminal buds. In *R. dumetorum*, buds surviving the effects of the acid resumed normal growth after 5 weeks.

699. TULLIS, E. C., and DAVIS, W. C. **Persistence of 2,4-D in plant tissues.** *Science* 111 (2874), 1950 (90). 3 refs. [Agricultural Research Administration, Beaumont, Texas.] O.R.S.

Symptoms characteristic of 2,4-D injury were observed in shoots of *Stillingia sebifera* a year after spraying. Similar injuries to *Melia azedarach*, however, did not persist into the following year. [Cf. *For. Abstr.* 11 (No. 3269).]

700. CRAIG, N., and EVANS, H. **Preliminary reports on the progress of weed control investigations in Mauritius.** *Revue Agricole de l'Île Maurice* 25 (4; 5; 6), 1946 (147–54; 198–212; 272–84); 26 (1; 2), 1947 (3–10; 53–62). [E.] I.I.E.

Describes investigations into the distribution, growth type and chemical control of *Hydrocotyle bonariensis, Mikania scandens, Artemisia vulgaris, Cordia macrostachya, Cyperus rotundus*, and a number of twining weeds. It was established that spraying with a 5% solution of $NaClO_3$ (to which has been added 0·25 c.c./l. of a wetting agent) is a most effective method of controlling *M. scandens.* The experiments for controlling *C. macrostachya* resulted in no method that would be both cheap and fully effective. The 'hormone' weed-killers (Weedone, Agroxone, Methoxone etc.) caused deformation of leaves etc. but did not kill. Ammonium D.N.O.C. was effective in killing *C. macrostachya*, but was harmless to other competing weeds. The experiments are reported in detail.

701. WILLIAMS, J. R. **A preliminary account of the project for the control of *Cordia macrostachya* (Jacq.) Roem. and Schult. (Herbe Condé) in Mauritius.** *Revue Agricole de l'Île Maurice* 27 (5), 1948 (214–33). 9 refs. [E.] I.I.E.

Preliminary report on an attempt to control *C. macrostachya* by releasing large numbers of

leaf-eating insects—*Physonota alutacea* and *Schematiza cordiae*. [Cf. *For. Abstr.* 10 (No. 2223); 11 (No. 3274).]

702. SIMMONDS, F. J. **Insects attacking *Cordia macrostachya* (Jacq.) Roem. & Schult. in the West Indies. I. *Physonota alutacea* Boh. (Coleoptera, Cassididae). II. *Schematiza cordiae* Barb. (Coleoptera, Galerucidae).** *Canad. Ent.* 81 (8; 11), 1949 (185–99; 275–82). 8 + 5 refs. [Commonwealth Bureau of Biological Control.] O.R.S.

Short life-histories of the beetles, two of a number of insects imported into Mauritius in experiments to find a suitable species for controlling *Cordia macrostachya*.

44.3. *Fungi*

See also *For. Abstr.* 12 (Nos. 179–81, 292, 763).

703. **Forest pathology.** *Special Supplement* to *For. Chron.* March, 1950 (24–34).

A review of current research in Canada.

704. BUGNICOURT, F. Sur une méthode de contaminations artificielles — son application pour la recherche d'arbres résistants à certaines maladies cryptogamiques. [**A method of producing diseases by artificial inoculation — its application in selecting trees resistant to certain cryptogamic diseases.**] *Rev. gén. Bot.* 57 (673), 1950 (157–67 + 2 plates). [F.] O.B.D.

A Van Tieghem moist chamber is filled with sterile water in which organisms having mycelia rich in sporangia are immersed. The chamber is then cooled in a refrigerator for 30–40 min. to cause the liberation of numerous zoospores. The rim of the chamber, thickly coated with vaseline, is secured to the trunk or branch to be infected, so that the water containing the zoospores is in contact with the bark or wood. After 3 or 4 days the dish can be removed and the infected area covered with a thick layer of vaseline. Some results of experiments with *Phytophthora palmivora* on *Hevea brasiliensis* and with *Phytophthora* sp. on *Cinchona ledgeriana* are included.

705. HARTLEY, C. **Fungicides for forest trees, shade trees and forest products.** *Bot. Rev.* 16 (1), 1950 (33–50). 56 refs.

Reviews and discusses the use of fungicides for the protection of both living trees and timber products.

706. GREEN, E. L. **Adhesives for fungicide dusts.** *Industr. Engng. Chem.* 42 (2), 1950 (324–30). P.R.

A method and apparatus for testing adhesives for horticultural mist dusting are described. The fungicide is fed into a small rotary blower. Water equal to 4 times the fungicide's weight, and carrying the adhesive to be tested, is added as a spray to the air stream as it leaves the blower. Glass microscope slides are sprayed, then weighed to measure the deposit as laid down and after exposure to artificial rain. Over 100 samples, mostly commercial products, were tested by this method, but very few increased the adherence of the fungicide. Surface-active agents (including detergents) were generally disappointing. Results are tabulated.

707. BEYLIN, I. G. Gribnŷe bolezni seyantsev i sazhentsev. [**Fungus diseases of seedlings and transplants.**] *Mikrobiologiya* 18 (4), 1949 (377–89). 36 refs. [Russ.russ.] N.C.L.

The plan for the establishment of shelterbelts or tree plantations in the Russian steppes provides *inter alia* for the raising of planting stock at a rate of 2,866 million in 1949, over 4,000 millions in 1950, and 26,685 millions in 1951–55. In the light of this, the author reviews the Russian literature on fungus diseases of young conifers and hardwoods, and finds the state of knowledge inadequate. Intensive research is needed, especially as the stock will be raised in an environment very different from that of the forest zone, and probably with a very different fungus and bacterial flora. What is needed is much more than the largely descriptive approach of most mycologists up to the present; this should be supplemented by experimental studies in the conditions of practical forestry and by efforts to find and breed disease-resistant trees.

708. YOUNG, H. E. ***Hendersonula agathi* n.sp., the cause of leaf cast of Kauri Pine in Queensland.** *Queensland Journal of Agricultural Science, Brisbane* 5 (1), 1948 (9–12). D.S.I.R.

'Leaf-cast' disease of Kauri Pine (*Agathis palmerstoni*) is described and shown to be caused by a sphaeropsid fungus which has a torula stage. The fungus is compared with

Hendersonula toruloides and shown to be a different species. The name *Hendersonula agathi* is proposed for the fungus and a diagnosis is given. *From author's summary.*

709. YOUNG, H. E. ***Rhizoctonia* root rot of Hoop Pine.** *Queensland Journal of Agricultural Science, Brisbane* 5 (1), 1948 (13–6). D.S.I.R.

An outbreak of root rot of *Araucaria cunninghamii* in a forest nursery is described, and the nature of the causal organism (*Rhizoctonia crocorum*) is discussed. Inoculation trials with pure cultures are described. Experiments, the results of which are tabulated, showed that applications of Cheshunt mixture (2 oz. powdered $CuSO_4$ and 11 oz. $(NH_4)_2CO_3$ ground together, and 1 oz. of the mixture dissolved in 2 gallons of water) at the rate of 1 gal./sq. yd. give good control. Results in routine treatments confirm this. No foliage injury has been found associated with the treatment, and the use of the fungicide at 4 times the normal strength does not harm the growth of Hoop Pine.

710. RENNERFELT, E. **The effect of soil organisms on the development of *Polyporus annosus* Fr., the root rot fungus.** *Oikos* 1 (1), 1949 (65–78). 22 refs. [E.e.] [Forest Research Institute of Sweden.]

The effects on *P. annosus* of 118 species of fungi and bacteria were investigated. More than one-third of these (mostly moulds or bacteria) had an inhibiting effect on the growth of *P. annosus* mycelium. The most powerful inhibition was exercised by *Penicillium claviforme*. Claviformin, a substance secreted by this organism, inhibited the germination of *P. annosus* conidia when diluted to *ca.* 25 p.p.m. [Cf. *For. Abstr.* 11 (Nos. 653–5).]

711. BUCKLAND, D. C., FOSTER, R. E., and NORDIN, V. J. **Studies in forest pathology. VII. Decay on Western Hemlock and Fir in the Franklin River area, British Columbia.** *Canad. J. Res.* 27*C* (6), 1949 (312–31 + 7 photos). 11 refs. P.R.

[Cf. *For. Abstr.* 9 (No. 1274), 10 (No. 2943).] Logs of 963 Western Hemlock (*Tsuga heterophylla*) and 719 Fir (mainly *Abies amabilis*) from the Juan de Fuca forest region were examined. Most of the decay in both species was caused by 8 species of fungi, those producing root and butt rots being *Poria subacida*, *Fomes annosus*, *Armillaria mellea* and *Polyporus sulphureus*, and trunk rots *Fomes pinicola*, *F. pini*, *Stereum abietinum* and *Hydnum* sp. (*H. abietis*). Scars were the most frequent means of entrance for infection. In 59% of the cases of infection, fungi had entered through wounds. Up to 350 years, Fir appears more resistant to attack than Western Hemlock. In the latter, maximum periodic volume increment was reached between 225 and 275 years; in Fir, the maximum was not reached until between 275 and 325 years, followed by a sharp decline. A close relationship betweeen age and diameter was found in both species. At the peak net volume of Western Hemlock 42% of the gross volume was lost by decay, and in Fir 29%. No consistent difference in loss by decay between fast- and slow-growing trees was found.

712. HUBERT, E. E. **Root rots of the Western White Pine type.** *Northw. Sci.* 24 (1), 1950 (5–17). A.P.B.

Cultures were made of fungi found in the root collar and root systems of Western White Pine [*Pinus monticola*] and associated species. The most important of these were *Armillaria mellea*, *Poria subacida*, *P. weirii* and *Fomes annosus*. The fungi are briefly described and a list of symptoms useful in their recognition is given. *P. subacida* was frequently the primary cause of windthrow, and wind and snow breakage.

713. MILBRATH, J. A., and YOUNG, R. A. **Root rot of *Chamaecyparis*.** *News letter to Nurserymen, Oregon State Department of Agriculture, Salem, Ore.* No. 60, 1949 (4).

Phytophthora lateralis is the causal organism of this disease, which kills large numbers of nursery stock, hedges etc. of *Chamaecyparis* spp. in Oregon and Washington. Soil drainage is an important factor in spreading the disease. Resistant and susceptible varieties of *Chamaecyparis*, *Thuja* and *Juniperus* are listed.

714. CICCARONE, A. *Monochaetia unicornis* (C. et E.) Sacc., agente patogeno di un grave cancro dei cipressi. [***M. unicornis*, pathogenic agent of a severe canker of *Cupressus macrocarpa* [in Kenya].**] *Ann. Sper. agr.* (*n.s.*), 3, 1949 (489–546). 55 refs. [It.it.e.] C.G.B.

Cf. *For. Abstr.* 9 (No. 2541).

715. Příhoda, A. Bělochoroš měkký—*Leptoporus mollis* (Fr. ex Pers.) Pilát na Moravě. [***Leptoporus mollis* in Moravia.**] *Lesn. Práce* 28 (1), 1949 (37–8). [Cz.]

Records the occurrence of this rare species on living and dead Norway Spruce in virgin and protection forest.

716. Příhoda, A. Účast hub na odumírání kleče (*Pinus mugo* Turra) v Jeseníkách. [**The rôle of fungi in the die-back of Mountain Pine in the Jeseníký [, Moravia].**] *Lesn. Práce* 28 (2/3), 1949 (70–93). 24 refs. [Cz.f.]

Describes, with drawings of fructifications and spores, and notes on occurrence and possible connexion with the die-back, the following fungi found on Mountain Pine in this region:—(I) *On needles*: (1) *Coleosporium* sp., a parasite which attacks and weakens completely healthy trees. (2) *Hypodermella sulcigena*, noted as having killed ½–⅔ of the 1-year-old needles of attacked trees in 1948, and therefore dangerous if attacks should be repeated for several years running. (3) *Lophodermium pinastri*, less injurious to Mountain Pine than to Scots Pine, but dangerous when it attacks in company with (2). (4) *Cryptomela allescheri*, found in small numbers in association with (2). (5) *Sclerophoma pithyophila*, the most frequent fungus on dead fallen needles in the region, and possibly purely saprophytic. (6) *Septopatella septata* and (7) *Pseudocenangium alpinum*, both little known and of obscure status as regards pathogenicity. (II) *On branches and stems*: (8) *Lachnellula chrysophthalma*, abundant on the dead branches, and possibly only saprophytic. (9) *Mytilidion gemmigenum*, a harmless saprophyte.

In the author's view the die-back is much more than a mycological problem: its soil, biochemical, climatic, entomological and silvicultural aspects need further study. In particular, attention should be paid to the question of provenance and to the possibility of selecting good strains from unattacked trees in this region.

717. Wenger, K. F. **The mechanical effect of fusiform rust cankers on stems of Loblolly Pine.** *J. For.* 48 (5), 1950 (331–3). 6 refs.

A number of cankered trees were felled and enough external and cross-sectional measurements made to enable the cross-breaking strength at the weakest point in the canker to be computed. The effect of the canker on the stem strength was expressed by taking the strength of the cankered section as a % of the normal strength at the same point. When this percentage was plotted against various canker dimensions (greatest width, ratio of length to width, open area, and % of stem circumference affected) it was found that % of stem circumference affected was much more closely related to % of normal strength than were any of the other factors. It was determined that the relationship of strength requirement (Y) and wind velocity (v) was $Y = 0{\cdot}0363\ v$, and, having regard to the wind velocities likely to occur in the region (South Carolina) it is deduced that a canker size of 55% of stem circumference is the size beyond which the canker will endanger the tree. The method of recognizing safe canker size in timber marking is discussed.

718. **Reports of the occurrence of active mycelium of wood-rotting fungi beyond the limits of visible decay in living deciduous trees.** *Repr.* from *Arborist's News* [*U.S.A.*] Feb., 1949 (19). P.R.

Tabulates data from literature between 1910 and 1942.

719. Batista, A. Chaves. ***Phyllachora jacarandae* n.sp.** *Bol. Sec. Agric. Ind. Com., Pernambuco* 16 (1/2), 1949 (1–2 + 7 plates). [Port.]

Describes a new fungus found on *Jacaranda* spp. in Brazil.

720. Moreau, C., Moreau, M., and Jacquiot, C. Une affection chancreuse de l'Okoumé au Gabon. [**A canker disease of *Aucoumea klaineana* in Gabon.**] *Revue de Mycologie, Paris, Supplément Colonial* 1948. pp. 28 + 2 plates. 7 refs. [F.] [Laboratoire de Cryptogamie du Muséum National d'Histoire Naturelle, Paris.]

(1) A study of *Pestalozzia aucoumeae* sp. nov., isolated from cankered wood and believed to be the cause of the disease, and of *Hypomyces ipomoeae* an associated fungus, and (2) an anatomical study of the affected wood and bark.

721. Marudarajan, D., Ramakrishnan, T. S., and Soumini, C. K. **Wilt of *Casuarina*.** *Curr. Sci.* 19 (2), 1950 (63–4). 3 refs. [Agricultural Research Institute, Coimbatore.] A.P.B.

Artificial inoculations of *Casuarina equisetifolia* with *Trichosporium vesiculosum* proved the fungus to be pathogenic to the tree and to cause wilting, drying and, eventually, death. It is a wound parasite, and infection may be airborne, since spores form profusely on dead trees. The fungus was isolated from trees suffering from wilt and is considered to be the cause of the known wilt disease. [Cf. *For. Abstr.* 10 (No. 1467).]

722. CRANDALL, B. S., and BAKER, W. L. **The wilt disease of American Persimmon [*Diospyros virginiana*] caused by *Cephalosporium diospyri*.** *Phytopathology* 40 (4), 1950 (307–25). 5 refs.

This is believed to be the fastest killing disease of vigorous and healthy trees on record. The fungus enters healthy trees through wounds made by various agencies. Studies of insects attacking Persimmon indicate that *Xylobiops basilaris* and *Oncideres cingulatus* are responsible for the vast majority of wounds in healthy trees produced by insects. The fungus was artificially established without difficulty in wounds similar to those caused by the beetles, and it was also isolated from wood taken from immediately behind wounds made by them. *From author's summary.*

723. BIRAGHI, A. Un probabile fenomeno di reversione nel castagno. [**A probable reversion phenomenon in *Castanea sativa***]. *Repr.* from *Ann. Sper. agr.* (*n.s.*) 2 (1), 1948 (129–34). 9 refs. [It.it.e.]

In two separate Chestnut stands the author has noted that many of the leaves in the new growth that occurs at the base of branches killed by *Endothia parasitica* are lobed and resemble the leaves of some species of Oak (e.g. *Q. rubra*, *Q. sessiliflora* and *Q. lanuginosa*). Owing to the systematic relation of *Castanea* and *Quercus*, the author considers that the abnormal pattern of Chestnut leaves may be referred to reversion.

724. BIRAGHI, A. La distribuzione del cancro del castagno in Italia. [**The distribution of Chestnut canker [*Endothia parasitica*] in Italy.**] *Ital. for. mont.* 5 (1), 1950 (18–21). [It.f.e.]

With map showing distribution at 11.12.1949.

725. BIRAGHI, A. Prove di inoculazione di castagni con *Endothia* sp. isolata in Biscaglia. [**Inoculation of Chestnuts with *Endothia* sp. isolated in Biscay.**] *Repr.* from *Ann. Sper. agr.* (*n.s.*) 2 (5), 1948 (687–91). [It.it.e.]

Castanea crenata growing in Biscay, Spain, was found to be suffering from a blight very similar to that caused by *Endothia parasitica*. Specimens of *C. sativa* growing near were perfectly healthy. *C. sativa* trees in Italy were inoculated with isolates obtained from the diseased *C. crenata*, and developed typical symptoms of *E. parasitica* infection. It is now proposed to test the resistance of the Spanish specimens of *C. sativa* by inoculating them with Italian isolates of *E. parasitica*.

726. GUPTA, S. L. **Occurrence of Chestnut-blight [*Endothia parasitica*] in the Kumaon hills.** *Curr. Sci.* 19 (1), 1950 (13–4). 4 refs. [Government Hill Fruit Research Station, Chaubattia, U.P.] A.P.B.

727. BIRAGHI, A. Nuovi ospiti di *Endothia parasitica*. [**New hosts of *E. parasitica***.] *Ann. Sper. agr.* (*n.s.*) 4 (1), 1950 (109–18). 6 refs. [It.it.e.] C.G.B.

E. parasitica has been found on *Quercus sessiliflora*, *Q. pubescens* and *Q. ilex* in areas of Italy where Chestnut blight has been long established. The identity of the parasite has been proved by its morphological and cultural characteristics and by inoculations on Chestnuts. It is suggested that *E. parasitica* on Oak may be a specialized race, and therefore its multiplication may threaten Oak woods. It has recently been observed on *Q. stellata* in the U.S.A. [Cf. *For. Abstr.* 9 (No. 1290).]

728. PIMENTEL, A. A. LOPES. A *Phytophthora cinnamomi* Rands, um outro agente, extremamente virulento, da 'doença da tinta' do castanheiro. [***P. cinnamomi*, another extremely virulent fungus causing Chestnut ink disease.**] *Agron. lusit.* 9 (3), 1947 (181–91). 15 refs. [Port.e.]

A comparison of *Phytophthora A* and the *P. cinnamomi* of Rands definitely established that they are the same species [cf. *For. Abstr.* 11 (No. 1466)], and that *P. cinnamomi* is distinct from *P. cambivora*. Among the chief characteristics of the former are its unusual virulence and its capacity for wide dispersal, probably due to the extraordinary profusion of chlamydospores produced. It affects several forest species (notably *Castanea sativa* and *Quercus*

suber) both in the nursery and in the stand. [Cf. *For. Abstr.* 12 (No. 122).]

729. LENTZ, P. L. **The genus *Marssonina* on *Quercus* and *Castanea*.** *Mycologia* 42 (2), 1950 (259–64). 7 refs. P.R.

Describes *Marssonina quercina* (Wint.) comb. nov. and *M. ochroleuca* (Berk. & Curt. ex Peck) comb. nov.

730. PARROT, A. G. L'Oïdium des chênes (*Microsphaera alphitoides* Grif. et Maubl.) au pays Basque français. **[Oak mildew (*M. alphitoides*) in the Pays Basque.]** *Trav. Lab. for. Toulouse* 1 (4) Art. 28, 1948. pp. 6 + 1 map. [F.] *Repr.* from *Bulletin de la Société d'Histoire Naturelle de Toulouse* 83, 1948.

Quercus toza is the most susceptible species in this region, and this is partly the cause of its disappearance in northern areas and in Labourd. A review is made of the distribution of the disease by cantons. Good results have been obtained in regenerating severely affected stands by planting resistant American species such as Red Oak [*Q. borealis*] and Swamp Oak.

731. MARCHIONATTO, J. B. Las citarias argentinas. **[The Argentine species of *Cyttaria*.]** *Alm. Minist. Agric. Argent.* 24, 1949 (127–8 + 3 plates). 6 refs. [Span.] A.P.B.

Short illustrated notes on (1) *Cyttaria espinosae*, parasitic in Neuquén on *Nothofagus obliqua*, and (2) *C. hookeri*, parasitic in Patagonia on *N. antarctica*, *N. dombeyi*, and also, occasionally, on *N. betuloides* and *N. pumilio*.

732. THIRUMALACHAR, M. J. **Some noteworthy rusts. III.** *Mycologia* 42 (2), 1950 (224–32). 8 refs. P.R.

Describes species of rusts including *Hapalophragmiopsis ponderosum* on *Acacia leucophloea* and *Scopella echinulata* on *Bassia latifolia* and *B. bourdilli*.

733. YOUNG, H. E. **Axillary gall of Queensland Maple.** *Queensland Journal of Agricultural Science, Brisbane* 5 (1), 1948 (1–8). 2 refs. D.S.I.R.

The occurrence, morphology, and previous observations concerning axillary gall of *Flindersia brayleyana* are discussed, and investigations described which showed that the disease is caused by a bacterium closely allied to *Xanthomonas tumefaciens*. *Author's summary.*

734. ŠKORIĆ, V. Holandska bolest briestova. **[Dutch Elm disease.]** *Repr.* from *Šum. List* 1943 (3). pp. 11. 38 refs. [Serb.g.] P.R.

A survey of the literature on *Ceratostomella ulmi* up to 1940, including two references from Croatia, where the disease was first noticed in 1929. The aspects dealt with include the symptoms, the causal fungus, its transmission, reaction of the Elm species and varieties, and control.

735. POMERLEAU, R. Rapport général des travaux effectués sur la maladie hollandaise de l'orme dans la province de Québec en 1948. **[General report on the measures taken against Dutch Elm disease in Quebec in 1948.]** Serv. for. Québec. [1949]. pp. 31 + 9 dgms. [F.]

The subjects dealt with include:—distribution and intensity of the disease; the manner of inoculation of Elms; possible correlation between season of the year and vulnerability of Elms to infection; seasonal activity of Elm cambium; season of the year during which bark beetles are infected; rate of propagation of the disease in the field.

736. FELDMAN, A. W., CAROSELLI, N. E., and HOWARD, F. L. **Physiology of toxin production by *Ceratostomella ulmi*.** *Phytopathology* 40 (4), 1950 (341–54). 9 refs.

737. PLUMB, G. H. **Control of *Scolytus* and Dutch Elm disease by concentrated DDT sprays.** *J. econ. Ent.* 43 (1), 1950 (110–1). 3 refs. [Conn. agric. Exp. Sta.]

Presents results of the second season's work in an investigation of the use of sprays in the control of bark-beetle vectors of Dutch Elm disease [cf. *For. Abstr.* 11 (No. 1504)]. The mist blower tested was a converted vapour duster. Using a round outlet 12 in. in diameter, the output was approximately 8,400 cu. ft. of air per min. at a velocity of 140 m.p.h. A DDT emulsion of 12·5% was used as a dormant spray, and one of 6·25% as a summer spray. By correlating dosage with trunk diameter (and therefore indirectly with crown size) it was estimated that 1 gal. was suitable for a street-grown tree of 10 in. diameter, and that the amount should be increased by 1 gal. for each additional 5 in. of diameter. A single spray during dormancy was just as effective as two applications (one during dormancy and one

during summer). Complete twig coverage can only be obtained before flowering occurs. The mist blower proved well suited to urban conditions, involving no danger to birds and animals through drip and run-off into puddles. A significant, though not complete, amount of control was obtained. [Cf. *For. Abstr.* 12 (No. 773).]

738. CAROSELLI, N. E. **Several fungus diseases of Elm.** *Sci. Tree Topics* 1 (10), 1949 (85–8).

Brief notes on leaf-spot diseases (*Gloeosporium ulmicolum, G. inconspicuum* and *Gnomonia ulmea*), twig canker die-back (*Sphaeropsis ulmicola*), phloem necrosis, a virus believed to be transmitted by a leafhopper *Scaphoideus motus*, wilt diseases caused by *Dothiorella* sp. and *Verticillium* sp., and pit canker, thought to be caused by *Phytophthora inflata*, with a list of other fungi frequently found on Elm.

45. DAMAGE BY ANIMALS

45.1 *Mammals*

See also *For. Abstr.* 12 (Nos. 273, 277, 882).

739. CHASE, W. W. **Recent advances in forest game management.** *Trans. N. Amer. Wildlife Conf.* No. 14, 1949 (232–8). 16 refs. B.A.P.

Discusses some problems connected with the control of animal and bird populations.

740. BUMP, G. **Deer damage control through herd management.** *Trans. N. Amer. Wildlife Conf.* No. 14, 1949 (604–11). [Conservation Department, Albany, N.Y.] B.A.P.

Discusses the possibility of controlling damage through organized herd reduction.

741. ARBOGAST, C. JR., and HEINSELMAN, M. L. **Damage to natural reproduction by deer browsing.** *Tech. Notes Lake St. For. Exp. Sta.* No. 332, 1950. p. [1].

A study of damage in 648 $\frac{1}{5}$-acre plots in the Hemlock and hardwood forests of the Argonne Experimental Forest, Wisconsin. Observations made in autumn and winter between December 1947 and May 1949 showed 'heavy' and 'very heavy' damage in 96·4% of plots.

742. POWELL, S. E. **Crop protection through a new deer repellent spray.** *Trans. N. Amer. Wildlife Conf.* No. 14, 1949 (567–76). [Department of Inland Fisheries and Game Department, Augusta, Maine.] B.A.P.

The deer repellent (Goodrite z.a.c. combined with Goodrite p.e.p.s., an adhesive) was formulated by Dr. L. L. Baumgartner and the B. F. Goodrich Chemical Co. When tested on crops and young fruit trees in dispersions of between 1 and 5%, considerable protection from browsing deer was obtained.

[Cf. *For. Abstr.* 11 (Nos. 1474, 2276).]

743. GRECHKIN, V. P. Mlekopitayuschie—vrediteli lesnÿkh kultur. [**Mammals causing injuries to forest plantations.**] *Lesn. Khoz.* 1950 (1), (54–7). [Russ.]

Describes and illustrates damage to 'Balsam Poplar' plantations in the Buzulukski Bor [cf. *For. Abstr.* 11 (No. 252)] by mice, snow-hare and elk. Control measures recommended are poison-baiting for mice, shooting of hares, and fencing against elk. Elk might also be discouraged by growing the Poplar with a dense underwood of non-palatable species, e.g. *Caragana arborescens.*

744. ADAMS, L. **Consumption of Ponderosa Pine seed by small mammals.** *Res. Note Nth. Rocky Mt. For. Range Exp. Sta.* No. 80, 1950. pp. 4.

This study showed that certain small mammals, especially the white-footed mice and chipmunks, consume substantial numbers of Ponderosa Pine seeds and apparently prefer them to seeds of other species. [Cf. *For. Abstr.* 12 (No. 253).]

45.2. *Birds*

See also *For. Abstr.* 12 (No. 739).

745. TURČEK, F. Krúžkovanie stromov d'at'lami. [**'Ringing' of trees by woodpeckers.**] *Lesn. Práce* 28 (6/7), 1949 (245–8 + plate) 8 refs. [Slovak.russ.e.] [Ústav pre ochranu lesov ŠVÚL, Bańská Štiavnica.]

Records a case of damage by *Dryobates major pinetorum* to 16 Scots Pine and 1 Larch on an area of 1·5–2 ha. in Slovakia. The Pine was 25 years old. A 75-year-old tree of *Quercus robur* was found which had been similarly damaged by *Picus viridis virescens.*

45.5. *Insects*

See also *For. Abstr.* 12
(Nos. 114, 206–18, 635, 672, 701–2).

746. Nederlandse bosinsecten: rapport van de Nomenclatuurcommissie met determinatietabel door het I.T.B.O.N. **[Forest insects of Holland: report of the Nomenclature Committee [of the Nederlandsche Boschbouw Vereeniging] with a determination table by the Instituut voor Toegepast Biologisch Onderzoek in de Natuur.]** Nederlandsche Boschbouw Vereeniging. [Printed by Ponsen & Looijen, Wageningen.] 1950. pp. 16. [Du.]

Presents information on the chief forest insect pests in a table which can be used as a key for their determination, the various columns giving the tree species concerned, type and season of attack, description of the pest, Dutch and scientific names of the pest, its bionomic formula, and notes (including any special precautions against attack).

747. **Recent developments in forest entomology [in Canada].** *Special Supplement* to *For. Chron.* March, 1950 (5–10).

A general review of developments, programmes, and trends of forest entomological research in Canada.

748. CRAIGHEAD, F. C. **Insect enemies of eastern [U.S.] forests.** *Misc. Publ. U.S. Dep. Agric.* No. 657, 1950. pp. 679. 440 refs. X.

749. GERBER, R. Welche Vogelarten verzehren Blatt-, Blut-, und Schildläuse? **[What birds feed on aphids, woolly aphids and scale insects?]** *Anz. Schädlingsk.* 23 (3), 1950 (39–43). 32 refs. [G.]

Reviews and lists European bird predators.

750. DAVID, W. A. L., and GARDINER, B.O.C. **Factors influencing the action of dust insecticides.** *Bull. ent. Res.* 41 (1), 1950 (1–61). Numerous refs.

751. KALANDRA, A. Ochrana leteckým poprašováním proti kalamitnímu lesnímu hmyzu v Československu. **[Control of forest insect outbreaks by aerial dusting in Czechoslovakia.]** *Lesn. Práce* 28 (2/3), 1949 (111–7). 9 refs. [Cz.russ.]

Briefly reviews the history of aerial control of forest insects in various European countries and in Czechoslovakia itself, where experience of such work is rather limited. The latest trials, in late May to early June 1948, were of dusting with 5% DDT (Gesarol) at rates of 70 down to 30 kg. or less per ha., against *Lymantria monacha* larvae between their first and third moults, on Scots Pine/Norway Spruce at Halámky in Bohemia and on Norway Spruce at Jablunkov in Silesia. Complete control of *L. monacha* was obtained. Other insects also suffered, especially tachinid and other flies, gnats, and ichneumon flies, but mammals and birds were not affected. No bees were present, as there were no sources of nectar.

752. WEAVER, N. **The toxicity of certain organic insecticides to honey bees.** *J. econ. Ent.* 42 (6), 1949 (973–5). 9 refs. [Texas Agricultural Experiment Station.]

Insecticidal dusts containing 666 were highly toxic to bees. At temperatures below 76° F. Chlordan was only slightly toxic, but at 86° its toxicity increased greatly. Toxaphene was practically non-toxic.

753. RIPPER, W. E., GREENSLADE, R. M., and HARTLEY, G. S. **A new systemic insecticide bis (bis dimethylamino phosphonous) anhydride.** *Bull. ent. Res.* 40 (4), 1950 (481–501 + 2 plates). 13 refs.

This anhydride, which has the empirical formula $C_3H_{24}O_3N_4P_2$, was proved to render plants toxic to 14 aphid species, one aleurodid, one mealy-bug (*Pseudococcus citri*), 2 jassids and 2 species of red spider. Translocation of the insecticide from one part of the plant to another varied from the thickness of a leaf to 3 ft. It was not toxic to non-plantsucking insects, e.g. predators and parasites, and can therefore be used as a selective insecticide for the control of aphids. A formulation containing 66% bis (bis dimethylamino phosphonous) anhydride was effective in controlling aphids and red spider. With aphids its efficacy lasted 2 to 5 weeks. The anhydride is toxic to mammals, but plant material treated with the concentrations used in the field had no ill effects in feeding trials. Protective cabs on tractors and protective clothing are necessary during spraying.

754. KERR, T. W. JR. **Insecticides for control of certain insects attacking ornamental trees and shrubs.** *J. econ. Ent.* 43 (1), 1950 (63–5). 2 refs. [R.I. State College.]

For control of the Holly leaf miner (*Phytomyza ilicis*) on *Ilex opaca* the most successful treatment was two applications of wettable 50% DDT (2 lb./100 gal. water), the first made when adult emergence began and the second 13 days later. For the woolly Beech aphid (*Phyllaphis fagi*), single applications of 40% nicotine sulphate and wettable 50% 666 were effective when used at 1 and 2 lb. in 100 gal. water. Wettable 25% lindane at ½ lb. and 1 lb./100 gal. water and 50% DDT at 1 and 2 lb./100 gal. water gave 99–100% control of the Oak lace bug (*Corythucha arcuata*) in one application. The population of a first-instar *Pulvinaria* sp. on *Taxus media* var. *hicksi* was reduced by 99% or more after a single application of 40% nicotine sulphate at 1 or 2 lb./100 gal. water. *From author's summary.*

755. COUTURIER, A., and ANTOINE, F. Pouvoir de rémanence, dans le sol, de l'action insecticide du H.C.H. et du S.P.C. vis-à-vis des vers blancs. [**The persistence in the soil of the insecticidal action of 666 and S.P.C. on cockchafer larvae.**] *C.R. Acad. Agric. France* 36 (3), 1950 (108–10). 2 refs. [F.] A.P.B.

Small areas in the Saône valley which had been treated in previous years with 666 preparations and S.P.C. (a derivative of benzene hexachloride) for control of cockchafer larvae were deliberately reinfested. Where the quantity of insecticide per ha. had amounted to 20 kg. or more, it retained its toxicity in the soil for one or two years, so long as the soil had remained fairly moist.

756. GERSDORF, E. Über die Verwendbarkeit neuartiger Insekticide zur Maikäferbekämpfung. [**The use of new insecticides in cockchafer control.**] *Anz. Schädlingsk.* 23 (4), 1950 (53–5). 2 refs. [Pflanzenschutzamt Hannover in Sehnde.]

Describes cockchafer (*Melolontha* spp.) control operations with 666 dusts in the Lüneberg and Ülze areas in 1949. It was noted that, with these preparations, the higher the temperature after dusting, the greater the death rate. Experiments were also made with Gesarol and a powder containing 3% DDT and 3% 666. The action of Gesarol was much slower than that of the pure 666, but the Gesarol was still active after 8 days, whereas the effect of the 666 persisted only up to 4 days. The speed of the action of the DDT/666 mixture was about the same as that of the 666 alone, but the effects of the mixture persisted 2–3 days longer.

757. GEMPERLI, L. Neues Verfahren im Kampf gegen den Maikäfer. [**New methods in the fight against the cockchafer.**] *Schweiz. Z. Forstw.* 101 (4), 1950 (166–7). [G.]

Describes further large-scale operations for cockchafer control by spraying fields and the edges of the forest with Hexalo (666) [cf. *For. Abstr.* 10 (No. 2983)]. The use of an Aero-Mist-Sprayer effected a great saving compared with an ordinary motor sprayer; it delivers 100–400 l./km. of forest edge as against 2,000–6,000 l. used by the motor sprayer, and it is therefore possible to use much higher concentrations (5–12% suspensions), while at the same time saving on the cost of transporting spray.

758. Mylecoetus-Befall an Nadelholz. [**Attack by *Hylecoetus* [*dermestoides*] on conifers.**] *Weltholzw.* 2 (4), 1950 (68–9). [G.] P.R.

Observations made in August 1949 on trees felled after the 1948 and before the 1949 flight period showed that:—(1) no standing trees were attacked; (2) in Spruce stands, stumps were heavily infested, barked stems were free from attack, and the only stem left unbarked was moderately infested; (3) in a mixed stand of Spruce and Pine, attack on Spruce was as described above and 2 Pines partly barked (apparently during felling) were moderately infested on parts with and without bark; (4) in 4 stands of Douglas Fir, stumps and stems were moderately to heavily infested; (5) in a Larch stand, stumps were heavily attacked and stems unaffected; (6) attack was heavier in shady than in sunny areas; (7) stems which had been attacked showed no further signs of attack after the bark was removed; (8) the cut surface of stumps was infested; and (9) Spruce was attacked in the lower half of the stem, 4 Douglas Fir stems throughout their length, and other species in the top half or often third of the stem. It is concluded that larvae cannot survive in wood after it has dried out.

759. ZIEGER, E. Über die Anwendung der Dämpfmethode in der Borkenkäferbekämpfung. [**Methods of using steam in bark-beetle control.**] *Anz. Schädlingsk.* 23 (3), 1950 (35–9). [G.g.]

In 1947–48 a number of mobile steam-heating units were designed for disinfesting

billets and tanbark, of bark-beetles. The units were built by the firm Gotthard u. Kühne, Lommatzsch/Sa., and tried out in the forest administration areas Colditz, Geringswalde and Hubertusburg. Performance and costs are discussed. A 100% kill is obtained with billets. The bark can still be used for tannin extraction or fuel, and no disturbance of the forest biocoenosis occurs, as when poison sprays are used. The steam units can control an outbreak with fewer trap trees and in a shorter time than methods with a lower killing rate. The mobile unit can only treat wood up to 30 cm. diameter and 2 m. in length. Costs amount to *ca.* 4 marks/cu.m.

760. CRIVELLARI, D. Eccezionale infestione di *Phloeosinus bicolor* Brullé in una cipresseta. **[Exceptional infestation of *Phloeosinus bicolor* in a Cypress [*C. sempervirens*] stand.]** *Ital. for. mont.* 5 (1), 1950 (35–6). 3 refs. [It.]

761. FRANZ, J. Zur Lebensweise des Buchdruckers, *Ips typographus* L. **[The life-history of *I. typographus*.]** *Anz. Schädlingsk.* 23 (4), 1950 (51–3). 10 refs. [G.g.]

Presents observations on the beetle's overwintering habits. From the end of March until the beginning of May the habit of mass feeding during the period between emergence and full maturity, offers good opportunities for effective control measures.

762. SCHWERDTFEGER, F. Die Ursachen von Borkenkäfer-Epidemien in Fichtenwäldern. **[The causes of bark-beetle epidemics in Spruce forests.]** *Z. Weltforstw.* 12 (4/6), 1948 (57–61). 9 refs. [G.e.f.]

Experiments during 1946 and 1947 showed that attack by bark beetles is related not to moisture content but to resin flow, and that when a tree is infested the resin flow is very much reduced. Trees with a small resin flow are normally selected as breeding trees. In favourable circumstances—a large number of breeding trees and suitable weather—the population of beetles will increase to such an extent that healthy trees with a normal resin flow are also attacked; even healthy trees attacked by large numbers of beetles at the same time, cannot produce sufficient resin in all parts of the stem to check the beetles. These observations apply especially to *Ips typographus* and *I. amitinus*, probably to *Pityogenes chalcographus* and possibly to similar species.

763. PFEFFER, A. Odumírání smrku v horských ochranných lesích. **[The dying of Norway Spruce in montane protection forest [in Czechoslovakia].]** *Lesn. Práce* 28, (4/5), 1949 (145–59). 9 refs. [Cz.russ.f.] [Ústav pro ochranu lesů Vysoké školy zeměděl. a lesního inženýrství, Prague.]

After a brief general note on these forests, of which Norway Spruce is the chief species, with notes on damage by man, domestic animals and atmospheric agencies, the bulk of this paper is devoted to observations on insect pests, the most important of which are:—(1) *Ips amitinus* and *I. typographus*, which frequently kill Spruce at the lower altitudes, especially near foci of infestation in adjacent production forests—e.g. areas where windthrow or breakage has occurred. *I. amitinus* is about 3 times as frequent here as *I. typographus*. Both species have only one generation per year at these altitudes. Associated and secondary species of beetle are listed. Death of the trees attacked by the bark beetles occurs within a matter of weeks. The bark of dead trees peels off and falls. The first fungus to invade is usually *Armillaria mellea*, and other fungi which follow effect rapid decay. (2) *Polygraphus polygraphus* and *P. subopacus* attack chiefly trees of 15–30 cm. in diameter, the trees dying gradually, usually in the following year. Such trees, though numerous, are scattered throughout the forests and are very rarely found in groups, hence dead trees long remain standing and aid in protection against windthrow. The bark is retained for a long time and fungus invasion is late in appearing. Notes are included on associated and secondary beetles. (3) *Dendroctonus micans* generally attacks recent wounds in the top of the tree, caused by breakage due to hoar-frost. Its attacks then spread gradually, the generations overlapping, for several years, during which the tree shows little outward sign of attack. In the 4th and 5th years the attacks are accompanied by those of *Tetropium castaneum* and *T. fuscum*, and at about this time fungi of the genus *Trametes* also invade, and the tree begins to die visibly, death usually occurring in the 6th to 7th year from the initial attack. These attacks are common, but usually pass unnoticed until the *Tetropium* stage, as it is the

larvae of these that finally girdle the stem. *Pityogenes conjunctus* occurs at the highest altitudes, where the Spruce meets the Mountain Pine zone, attacking the tops and branches of young Spruce 2–3 m. high which have been damaged by hoar-frost. *P. conjunctus* is a serious pest of Mountain Pine but its attacks on Spruce, though frequent, are accidental in nature.

764. KEEN, F. P. **The influence of insects on Ponderosa Pine silviculture.** *J. For.* 48 (3), 1950 (186–8).

A brief account of the main insect pests of Ponderosa Pine, notably *Dendroctonus monticolae*, *D. brevicomis*, *D. ponderosae*, and *Melanophila californica.*

765. RÜEDI, K. Beobachtungen über die Tannentrieblaus. [**Observations on *Adelges nüsslini.***] *Schweiz. Z. Forstw.* 101 (5), 1950 (223–6). [G.]

Silver Fir regeneration under a close canopy of Spruce, appears hardly to suffer from *Adelges nüsslini*, and there is little root competition between the two species. When the *Adelges* does occur on Fir regeneration in such a situation, it is usually under the influence of strong side light, or in openings caused by windthrow. It was noted in several cases that tits flocked to infested trees in the breeding season, knocked off the dried-up buds, and apparently ate the *Adelges*. These trees put out fresh buds later in the summer and quite recovered. Nesting boxes are now being placed in infested stands to attract tits to breed there.

766. **Some significant findings in Spruce budworm studies.** *Rep. Ntheast. For. Exp. Sta. 1949*, 1950 (18–20).

Plots were established in 1945 in Balsam/Spruce stands heavily infested with budworm. Some 400 acres were cut over to increase the stand's resistance to attack, removing all overmature or stagnating Balsam Fir and leaving vigorous, rapid growing Fir and a large proportion of Spruce. After 6 years of heavy defoliation, more than ⅔ of the residual Balsam Fir appeared to be dead, but closer examination showed that only 27% of the trees have actually died. Losses are concentrated in Balsam Fir trees of small size, low vigour, and short crowns, and growing in the open. Only 18% of trees of 4 in. d.b.h. and over have died, compared with 31% of smaller trees. Mortality has been 11% in the high, 18% in the medium and 27% in the lowest vigour class. None of the trees with crown diameter 0·7 or more of total height have died, but 44% of those with crown ratio 0·3 or less have been lost. Young stands growing under a closed canopy of hardwoods have suffered almost no loss, while similar stands growing without crown shelter have in some cases lost as many as 65% of trees. Pure, or nearly pure, stands of Balsam Fir suffered most, and degree of mortality was more closely associated with total basal area of Fir than with average size of tree. [Cf. *For. Abstr.* 12 (Nos. 217–8).]

767. FURLANI, S. Il DDT contro la *Thaumetopoea pit.* Schiff., processionaria del pino. [**The use of DDT against *Thaumetopoea pityocampa*, the Pine processionary caterpillar.**] *Boll. Staz. For. Trieste* No. 1, 1947 (27–79 + 5 photos, 1 dgm., 3 tbls.). 26 refs. [It.it.e.g.f.]

Describes in detail research carried out in 1945–46 on the control of *T. pityocampa.* Observations were made of nests in large heated cases or greenhouses. The method of control recommended is the application to each nest, by means of the Furlani motor unit [cf. *For. Abstr.* 12 (No. 672)], of about 40 c.c. of a solution of DDT (5–7%) in naphtha, in February or March. An appendix describes successful field trials of this method. It is important that the solution should not be of too low a concentration. [Cf. *For. Abstr.* 10 (Nos. 2281–2); 11 (No. 2307).]

768. FURLANI, S. Sulla lotta contro la *Thaumetopoea pit.* Schiff. nella V.G. nell'inverno 1945–46: confronto fra il sistema della raccolta dei nidi ed un sistema coll'impiego del DDT. [**Counter measures against *T. pityocampa* in Venezia Giulia in the winter of 1945–6: comparison between the collection of nests and the use of DDT.**] *Boll. Staz. For. Trieste* No. 1, 1947 (115–28). [It.it.e.f.g.]

The application of DDT to nests by the Furlani motor unit avoided damage to the trees, reduced the number of larvae surviving, and used only 17% of the labour involved in collecting nests.

769. LEW, T. W., and CHEU, S. P. **Some investigations on the hibernation and**

winter control of the Pine caterpillar in Kwangsi. *Extr.* from *Kwangsi Agriculture* 2 (1), 1940 (2–13). [Chin.e.] I.I.E.

The overwintering habits of *Dendrolimus punctatus* were found to be greatly influenced by climatic conditions, essentially temperature. Whereas in S. Kiangsu and central Chekiang most of the larvae hibernate under loose bark [*Pinus massoniana*], in S. Chekiang and in Kwangsi the majority overwinter in the needles and resume feeding during warm winter days. In Kwantung, where the winter is mild, there is practically no hibernation at all.

At Liuchow, Kwangsi, the larvae had 3 generations annually, 85% of them overwintering in the needles. The number of needles damaged and the daily frass excretion were found to be significantly correlated with the mean daily temperature (lower than 6° C. stopping feeding) and the duration of sunshine. The 15% of larvae hibernating under bark were activated much more by sunlight than by rise in temperature.

The significance of these findings for control measures in provinces enjoying milder winters is discussed. [Cf. *For. Abstr.* 8 (No. 2126).]

770. POLIVKA, J. B. **Parathion to control bagworms.** *J. econ. Ent.* 43 (1), 1950 (109). [Ohio agric. Exp. Sta.]

Arbor-vitae trees [*Thuja occidentalis*] infested by the bagworm, *Thyridopterix ephemeraeformis*, were sprayed in July and August with parathion at the rate of 1 lb./100 gal. water. This treatment caused the death of all larvae on the sprayed trees, and enabled the bags to be pulled off and torn open with ease.

771. MILLER, O. B. [***Eucalyptus camaldulensis* attacked by a wood borer.**] *Rep. For. Dep. Bechuanald. 1949*, 1950 (1).

During October, towards the end of the dry season, several young trees of *E. camaldulensis* were found to be attacked by a wood-borer, *Sinoxylon transvaalense*, which usually only attacks dead wood. The attack ceased when the rains came.

772. MOUTIA, L. A. Notes sur l'introduction à Maurice de l'insecte: *Anaphoidea nitens* Gir., le parasite du charançon de l'Eucalyptus: *Gonipterus scutellatus* Gyll. [**Notes on the introduction to Mauritius of *Anaphoidea nitens*, a parasite of the Eucalyptus weevil *Gonipterus scutellatus*.**] *Revue Agricole de l'Île Maurice* 25 (5), 1946 (211–2). [F.] I.I.E.

773. BROMLEY, S. W. **Elm tree insect pests and spraying.** *Sci. Tree Topics* 1 (10), 1949 (79–85).

Brief notes on insect pests of Elm and results of laboratory experiments at the Bartlett Tree Research Laboratories in the control of *Scolytus* sp. Various types of spray were tested on small caged Elms. The most successful were lead arsenate or wettable DDT. A suggested spray programme for Elm protection is presented. [Cf. *For. Abstr.* 12 (No. 737).]

774. BARNES, H. F. **Gall midges of economic importance. VI. Gall midges of miscellaneous crops.** Crosby Lockwood & Son Ltd., London. 1949. pp. 229. 362 refs. Price 15*s*.

Includes sections on gall midges injurious to Bamboos and to Willows.

775. TAPIA, E. A. Cochinilla negra del duraznero, *Pseudaulacaspis pentagona* (Targ. Tozz.). [**The Peach scale, *P. pentagona*.**] *Alm. Minist. Agric. Argent.* 24, 1949 (245–7). [Span.] A.P.B.

A short life history of the insect, which, originating in Italy, has now spread over the world, and is an important pest of fruit, ornamental, and forest trees in Argentina. Some natural enemies exist, but the best control method is spraying with DDT or Ca polysulphide preparations. Some instructions for spraying under Argentine conditions are given.

776. **Oak pit scale control in California.** *Amer. Nurserym.* 91 (8), 1950 (49–51).

Good control is obtained by spraying with a mixture of 1½ lb. toxaphene to 100 gal. of oil emulsion. The use of toxaphene alone, or of DDT with the emulsion, was ineffective. Some account is given of the 3 species of *Asterolecanium* involved.

777. MUNRO, J. A., and POST, R. L. **Control of Boxelder bugs.** *J. econ. Ent.* 42 (6), 1949 (994). 1 ref. [North Dakota Agricultural Experiment Station, Fargo.]

Lists the toxic effects of water solutions made from emulsion concentrates of DDT, chlordane, toxaphene, lindane and a new nitroparaffin compound known under the code

number *CS–645A* on the Boxelder [*Acer negundo*] bug (*Leptocoris trivittatus*).

778. Brauns, A. Ameisen als Holzzerstörer. [**Ants as wood destroyers.**] *Holz-Zentralblatt, Stuttgart* 76 (43/44), 1950 (445). 9 refs. [G.]

Describes, briefly, cases of damage to wood by *Camponotus herculeanus*, and, in particular, a nest found in the heartwood of an Oak over 150 years old.

779. Příhoda, A. Poškození listů samotářskými včelami. [**Leaf injuries caused by solitary bees.**] *Lesn. Práce* 27 (10/12), 1948 (321–6). 22 refs. [Cz.fr.]

Notes on injuries to various hardwoods caused by *Megachile* spp. and by a species as yet unidentified, possibly of a different genus.

780. Chrystal, R. N. **The Alder wood-wasp, *Xiphydria camelus* L., and its parasites at Lynford, 1948–49.** *Lynfordian* 1950 (4–6).

Cf. *For. Abstr* 11 (No. 2607).

781. Chambers, V. H. ***Croesus brischkei* Zaddach, a sawfly (Hym., Tenthredinidae) new to Great Britain.** *Ent. mon. Mag.* 86 (1030), 1950 (85–6).

Found on *Carpinus betulus* in Bedfordshire.

782. Hammond, F. R. **The fall canker-worm, *Alsophila pometaria* Harris.** *Bi-m. Progr. Rep. For. Insect Invest. Dep. Agric. Can.* 6 (1), 1950 (3).

Reports on experiments in the control of *A. pometaria* with (1) foliage sprays, (2) ground sprays, (3) tree-trunk sprays of (*a*) halogenated hydrocarbons, (*b*) DDT, (*c*) parathion, (*d*) chlorinated camphene, (*e*) 666, and (*f*) chlordane. (1) (*a*) gave 100% control, and good results were obtained with (*b*), (*c*) and (*f*). In (2) egg-laying was reduced from 1 cluster per female in untreated plots to 0 by (*b*), $\frac{1}{8}$ by (*a*), and $\frac{1}{2}$ by (*c*). (3) (*a*) and (*b*) reduced egg-laying and shortened the average life of females by one-half. Other treatments were ineffective.

783. Kolubajiv, S. Význam některých druhů ploštic jako přírodních nepřátel obaleče dubového *Tortrix viridana* L. [**The importance of some species of predatory bugs as natural enemies of *Tortrix viridana*.**] *Zpr. výzkum. Úst. lesn. ČSR* No. 2, 1948 (254–9). 15 refs. [Cz.russ.e.] [Ústav pro ochranu lesů, Prague.]

During the 1940–46 outbreaks of *T. viridana* in western Czechoslovakia, large numbers of Miridae appeared on infested trees in many areas. Those recorded and discussed by the author are *Calocoris ochromelas, Cyllocoris flavoquadrimaculatus, C. histrionius, C. luteus* and *Sthenarus roseri*. Sampling of individual infested trees in the Purkhrabský Haj forest district, near Prague, showed that these predators in some cases destroyed more larvae and pupae of *T. viridana* than did parasites, e.g. in 1944 the bugs destroyed *ca.* 30% and the parasites only 12–16%, and in 1945 the corresponding figures were 20–37% and 12–17%. Some notes are included on a preliminary study of changes in insect populations on a single young Oak during 1944–46. The desirability is urged of further studies of the biology of the bugs and their role in natural control of *T. viridana*.

784. Kolubajiv, S. Příspěvek k poznání biologie některých druhů dravých ploštic z čeledi Miridae-Capsidae. [**Notes on the biology of some predatory bugs of the family Miridae (Capsidae).**] *Lesn. Práce* 27 (8/9), 1948 (273–9). 19 refs. [Cz.e.russ.]

Brief notes on *Calocoris ochromelas* and *Cyllocoris histrionius* and their role in the natural control of *Tortrix viridana*. [Cf. *For. Abstr.* 10 (No. 2287) and preceding abstract.]

45.4. *Other Animals*

785. Steiner, G. **Nematodes that attack Boxwoods and their control.** *Proc. nat. Shade Tree Conf. 1949* (108–20).

Cf. *For. Abstr.* 11 (No. 1505).

47. INJURIES OF ALL KINDS TO INDIVIDUAL TREE SPECIES

See also *For. Abstr.* 12 (Nos. 716, 763).

786. Rolando Martín, R. Estado sanitario de los bosques de Tierra del Fuego. [**The state of health of the forests of Tierra del Fuego.**] *Alm. Minist. Agric. Argent.* 24, 1949 (423–30). [Span.] A.P.B.

Enumerates and briefly discusses types of disease and their extent in the forests of Tierra del Fuego, much of which is overmature. In 2 types of *Nothofagus pumilio* forest in the

Larsiparshak valley, among trees with a diameter greater than 30 cm., 78·54% in type 1, and 75·86% in type 2 were diseased.

787. BUCHANAN, T. S. **Progress in research on pole blight of Western White Pine [*Pinus monticola*].** *Abstr.* in *Northw. Sci.* 24 (1), 1950 (34–5). [University of Idaho.] A.P.B.

A summary of the research projects now being undertaken by the U.S. Forest Service, the U.S.D.A. Division of Forest Pathology and the School of Forestry of Idaho University. [Cf. *For. Abstr.* 9 (No. 2592); 11 (No. 3362).]

5. MENSURATION. INCREMENT. YIELD

See also *For. Abstr.* 12 (Nos. 3–5).

52. MEASUREMENT OF TREES AND TIMBER

See also *For. Abstr.* 12 (No. 842).

52.2. *Height. Length*

See also *For. Abstr.* 12 (Nos. 833–4).

788. CURTIS, J. D. **Two useful tools in forest research work.** *J. For.* 48 (3), 1950 (202).

Describes (1) a home-made brass hypsometer for measuring tree heights, and (2) a tree slapper for marking trees, lines through woods etc., which can also be made at home.

789. LEPORSKY, A. Výška stromu jako taxační veličina a její použití v lesnictví. [**Tree height as a mensurational quantity, and its use in forestry.**] *Zpr. výzkum. Úst. lesn. ČSR* No. 2, 1948 (260–319). [Cz.russ.e.] [Ústav lesnické ekonomie, Brno.]

A review, written from the mathematical standpoint and with chief emphasis on the construction and use of height curves. The main headings are: tree height (general principles of measurement, instruments, height measurements in forestry, uses of data obtained); construction and use of height curves (theory and methods, with a set of 17 rules governing their construction and use); mean stand height (in which it is concluded that the arithmetical mean is the most suitable measure); and methods of obtaining the arithmetical mean height.

790. KORSUŇ, F. Grafikon výšek. [**The height curve.**] *Lesn. Práce* 27 (10/12), 1948 (326–37). [Cz.russ.e.] [Státní výzkumný ustav les. ekonomie.]

Reports on a study of a homogeneous, even-aged (55-year-old) Norway Spruce stand, comprising 1,000 trees on an area of 0·712 ha., to determine how many tree heights per diameter gradation (2-cm. intervals) must be measured in order to construct a reliable height curve. Height curves were constructed, based on numbers of height readings varying from 1 to 9 per diam. gradation, the actual values being smoothed by a second-order parabola the coefficients of which were computed by the method of least squares. Results, which are given in tables and graphs, indicated that two height readings per gradation, taken in different parts of the stand, sufficed to give mean errors of less than 50 cm. and 2% in mean stand height and stand volume respectively. Accuracy was not improved by taking more than two heights per gradation, but a single height measurement per gradation gave unreliable results.

52.3. *Form. Taper*

See also *For. Abstr.* 12 (Nos. 327, 803).

791. CAMP, H. W. JR., and BICKFORD, C. A. **Binoculars with mil scale as a training aid for estimating form class.** *Sta. Pap. Ntheast. For. Exp. Sta.* No. 32, 1949. pp. 11.

Instructions for the use of binoculars and Abney level in this type of work, with examples, and alinement chart for converting topographic units to slope correction in links, the mil-scale reading to in., and diameter measurements to form class.

52.4. *Measurement of Volume*

792. HIDE, R. H. **Squaring the circle or the forester and his escapes from π.** *Emp. For. Rev.* 29 (2), 1950 (146–51). 14 refs.

Some volume-measurement systems (Hoppus, British Customs House Measure, 'Fifth Girth', and several French systems—e.g. Volume au quart, Volume au sixième déduit, Volume au dixième déduit (= inscribed square) or Volume à vive arête) are considered as

examples of formulae designed to avoid the unlimited decimal places of π and to allow tables to be constructed simply. The equivalent sectional areas are shown as squares in a diagram and compared with the circular sectional area of an equal true solid volume. Conversion factors for these systems have been recalculated from first principles to correct errors in some of the published tables.

793. KORSUŇ, F. Nový jednoduchý vzorec. [**A new simple formula [for the volume of standing trees].**] *Lesn. Práce* 28 (6/7), 1949 (287–90). [Cz.russ.e.] [Výzkum. ústav les. ekonomie, Brno.]

Presents a new formula (which is that of a solid paraboloid) for determining the volume of standing stems: $V = 0{\cdot}4363 \times d_{\frac{1}{10}} \times H$, where V is volume, and $d_{\frac{1}{10}}$ is diameter at $\frac{1}{10}$ of H, the height. For practical measurements this has the advantage of requiring a diameter at a height accessible from the ground or with a short, light ladder. A preliminary check on 100 trees each of Spruce and Beech showed results a little too low in the former and a little too high in the latter case. By substituting empirically determined values for the theoretical constant 0·4363, a satisfactory degree of accuracy was obtained. Such empirical factors should be worked out on adequate statistical material for these and other common species individually. If suitable tables, similar to volume tables, were compiled, it would be possible to use this formula for mechanical methods of computation.

794. KORSUŇ, F. Přesné kubovací methody. [**Accurate methods of determining log volume.**] *Zpr. výzkum. Úst. lesn. ČSR* No. 2, 1948 (320–40). 12 refs. [Cz.russ.e.] [Ústav lesnické ekonomie, Brno.]

The object of this study, the material for which consisted of 100 Spruce logs, was to compare the accuracy of Huber's sectional-measurement formula $V = h\,(K_1 + K_2 \ldots K_n)$, where V = volume, h = length and $K_1 \ldots K_n$ are the sectional areas at the mid-length of each successive section, using different combinations of section length (1 or 2 m.) and number of diameters (2 or 4) measured at the mid-point of each section, with that of Simpson's formula

$$V = \frac{h}{6}\,[K_o + K_n + 4\,(K_1 + K_3 + \ldots + K_{n-1}) + 2\,(K_2 + K_4 + \ldots + K_{n-2})]$$

(notation as above, except that the K values represent top and butt sectional areas of each successive section), used on 1-m. sections and with 4 diameter measurements at each of the points corresponding to the K values. Diameters were measured in all cases to an accuracy of 1 mm., and the results obtained with Simpson's formula are used as the basis on which the relative errors of the methods using Huber's formula are compared. From the results, which are tabulated, it appears that Huber's formula, when used on 1-m. sections on each of which 4 diameter measurements are made, is practically as accurate as Simpson's. The latter, though very accurate, is cumbersome to use and requires twice as many diameter measurements. [Cf. *For. Abstr.* 7 (No. 2083).]

795. NISULA, P. Tukkien kuutiointi nopeammaksi ja yksinkertaisemmaksi. [**To speed up and simplify the calculation of log volumes.**] *Metsät. Aikak.* 1949 (6/7), (221–3). [Fi.]

Account, with illustration, of a tally sheet wherein vertical columns for each foot of log length show the o.b. diameters (in inches) necessary in order that each horizontal row shall represent logs of the same volume (given to the nearest $\frac{1}{2}$ cu. ft. in the left-hand column) though differing in length and diameter. The number of such logs is tallied and totalled for each row in spaces to the right. Greater ease and quickness in booking and in ultimate volume calculation, whether direct or by machine, are claimed for this method; also applications to standing forest, especially the quick assessment of volume or value to be cut. Application for a patent has been made.

796. Koivupölkkyjen kuutiosuhdetaulukkoja. [**Scaling tables for Birch logs.**] *Julk., Metsäteho, Helsinki* No. 4a, 1947. pp. 19. [Fi.]

Gives tables for total length against (*a*) top diameter o.b. and (*b*) diameter o.b. at 18 ft. from butt.

797. KOZHIN, N. I. O peresmotre tablits ob'emov srublennogo lesa. [**The revision of volume tables for felled timber.**] *Lesn. Khoz.* 1950 (1), (32–4). [Russ.]

Concludes from an examination of the errors involved in log scaling by standard Russian tables, that these are largely to blame for the discrepancies between the relatively accurate

records of standing timber volume and those of actual outturn from the same areas, and urges the necessity of compiling new log-scaling tables.

798. HIDE, R. H. **The general volume tables of the 1942 census of woodlands.** *Quart. J. For.* 44 (2), 1950 (83–7).

Gives tables for European Larch, Scots Pine, Douglas Fir, and Norway Spruce.

799. ARONICA, I. Tavola dendrometrica del faggio del bosco Vallonina. [**Volume table for Beech in the Vallonina (Rieti) woods.**] *Ital. for. mont.* 5 (1), 1950 (16–7). [It.f.e.]

800. MESAVAGE, C. **Tables for estimating cubic-foot volume of timber.** *Occ. Pap. Sth. For. Exp. Sta.* No. 111, 1947. pp. 70.

Tables compiled for use in estimating the cubic-foot contents of standing timber. Although prepared primarily for eastern (U.S.) hardwoods and southern softwoods, they can be adapted to other species. When these tables are used in conjunction with the board-foot tables already published [cf. *For. Abstr.* 9 (No. 619)], separate estimates of cubic- and board-foot volume for sawlog-size trees may be secured from the same cruise tally.

801. OLSON, A. R., CHAPMAN, G., and HICOCK, H. W. **Connecticut volume tables for plantation-grown White Pine, *Pinus strobus* L.** *Bull. Conn. agric. Exp. Sta.* No. 514, 1948. pp. 23. 9 refs.

802. NORDIN, V. J., and CAFLEY, J. D. **The effect of decay on recoverable volume in Hard Maple in Ontario.** *For. Chron.* 26 (1), 1950 (38–44). 4 refs.

Six local volume tables showing cull % due to decay.

803. KRENN, K. Die Bestandesmassenermittlung mit Hilfe stehender Probestämme, mit einem Anhang über die Bestimmung der echten Schaftholzformzahl und Ausbauchungsreihe aus dem echten Formquotienten, von K. Krenn und M. Prodan. [**Estimation of stand volume with the aid of standing sample trees, with an appendix by K. Krenn and M. Prodan on the determination of true stem form factor and diameter-quotient series from the true form quotient.**] *SchrReihe Akad. dtsch. Forstwiss.* No. 8, 1944. pp. 147. 35 refs. [G.g.] [Badische Forstliche Versuchsanstalt, Universität Freiburg i. Br.]

An investigation of the accuracy of the better known sample-tree methods, on the basis of numerous survey data, gave the following descending order of preference: Hohenadl [cf. *For. Abstr.* 1 (192); 3 (172, 260); 9 (No. 1933)], Hartig, Urich, and tree of mean basal area. The theoretical bases of Hohenadl's method are examined, with special consideration of the possibility of determining the true stem form factor of a stand from measurements made on trees removed in current fellings, a procedure, which with very minor reservations, is found satisfactory. The statistical material is also used to study the dispersion of heights, true stem form factor and form quotients; the nature of the curves for true stem form factor $\lambda_{0\cdot9}$ and for the square of the form quotient of the root swelling q^2

$$\left(=\frac{d^2_{1\cdot3}}{d^2_{0\cdot9}}, \text{ i.e. d.b.h./diam. at } \tfrac{1}{10} \text{ of tree height}\right)$$

as functions of d.b.h., is also examined. It is shown that in regular stands 20 felled stems for determining stem form factor, and 20 standing trees for measurements of height and form quotient, suffice to give a mean error of $\pm 2\%$ in the estimate of stand volume. In irregular stands (e.g. selection forest) the number of sample trees must be increased (up to *ca.* 50). The concluding section describes practical procedure for Hohenadl's method, with examples.

The appendix deals in detail with the discovery of relationships discussed in a later paper [see *For. Abstr.* 7 (No. 2080)] between the true stem form factor $\lambda_{0\cdot9}$ and the true form quotient $\eta_{0\cdot5}$ (i.e. diam. at $\frac{1}{2}$ height/diam. at $\frac{1}{10}$ height), and between these and the series of diameter quotients $\eta_{0\cdot9}$ to $\eta_{0\cdot1}$ (*Ausbauchungsreihen*) at 0·9, 0·7, 0·5, 0·3 and 0·1 of tree height (measuring from the top), i.e. forming the taper curve based on diam. at $\frac{1}{10}$ height ($d_{0\cdot9}$). Between $\eta_{0\cdot5}$ and $\lambda_{0\cdot9}$ there exists a rectilinear correlation which is independent, so far as the statistical material used is concerned, of species (conifers and hardwoods), site, structure of stand and silvicultural treatment, though $\lambda_{0\cdot9}$ and the diameter-quotient series vary with such factors. Thus, knowing $\eta_{0\cdot5}$ for a stand, it is possible to read off $\lambda_{0\cdot9}$ from a table (given), or vice versa. The diameter-quotient series also proved to be very

closely correlated with $\eta_{0\cdot5}$ and $\lambda_{0\cdot9}$, enabling values to be tabulated for $\eta_{0\cdot9}$ to $\eta_{0\cdot1}$ against $\lambda_{0\cdot9}$. Hence, once $\eta_{0\cdot5}$ is determined, it is possible to read off from a table the appropriate values for $\lambda_{0\cdot9}$ and $\eta_{0\cdot9}$ to $\eta_{0\cdot1}$ for any stand, diameter class or gradation whose height and diameter at $\frac{1}{10}$ height is known, and to convert these relative values to absolute figures. This procedure is of great importance for studies of assortments and timber values. The true form quotient $\eta_{0\cdot5}$ may be determined either from fellings or, with the aid of a telescope dendrometer, from standing trees. Consideration of the errors involved shows that they would be negligible in practice.

804. Hönig, E. Inventarisace porostů methodou Hohenadlovou a použiti této methody ke zjištění přírůstku běžného. [**Stand enumeration by Hohenadl's method and the application of this method to the determination of current increment.**] *Lesn. Práce* 28 (1; 2/3), 1949 (10–31; 94–111). 10 refs. [Cz.russ.e.]

The author makes a detailed theoretical analysis of Hohenadl's method [cf. preceding abstract] and gives practical illustrations of its use. Particular attention is paid to its application in the determination of increment % (the older methods being adjudged inadequate) and current increment in diameter, volume and value. It is concluded, in agreement with Krenn's findings [see *For. Abstr.* 3 (260)] that Hohenadl's method is entirely suitable for these purposes.

805. Foury, P. Méthodes de reconnaissance rapide des forêts tropicales. [**Methods for rapid reconnaissance of tropical forests.**] *Bois For. Trop.* No. 13, 1950 (16–23). [F.e.span.]

Urges the advantages of strip cruises over sample plots, for reconnoitring soils and composition of tropical forest.

54. FACTORS CONNECTED WITH ASSORTMENT

806. Guttenberg, S., and Duerr, W. A. **A guide to profitable tree utilization.** *Occ. Pap. Sth. For. Exp. Sta.* No. 114, 1949. pp. 18. 7 refs.

A guide for determining the most profitable products to be taken from a tree of given dimensions and form. Though concerned primarily with Southern Pine, the principles apply equally to any species. An appendix gives some data on conversion costs.

807. Lorenz, W., and Fox, H. W. **Size and number of 7-foot White Pine fence posts by tree diameter classes.** *For. Note Ill. agric. Exp. Sta.* No. 14, 1950. p. 1.

56. INCREMENT

See also *For. Abstr.* 12 (Nos. 243–4, 309–12, 326–7, 804).

808. Petrini, S. Tillväxtprognoser vid skogsindelning: Två problem. [**Two problems in calculating future increment in forest management.**] *Skr. K. Skogshögsk., Stockh.* No. 2, 1949. pp. 12. [Sw.sw.e.]

(1) The old method of calculating increment in Sweden is based on a straight-line relationship and tends to underestimate; the function of compound interest affords a better representation of the development of volume increment. Graphs are given showing the increment for diameter and basal area in thinned stands of Pine and Spruce. (2) The formula for determining % increment over a term of years takes no account of trees dying during the period. Studies of 2 sample plots showed that the difference between actual and estimated increment is slight for ages over 30 years if heavy thinnings are carried out every 5 years; if the thinning is done at 10-year intervals the difference continues to be noticeable up to 50 years, and if there is no thinning at all, the difference between the 2 figures is considerable. No figures are available for young stands, in which the difference will be greatest.

809. Hummel, F. C., and Brett, I. **A simple method of estimating volume increment in stands of young conifers.** *Emp. For. Rev.* 29 (1), 1950 (58–9).

Examination of the permanent sample plot records of the Forestry Commission suggests that in young coniferous stands a satisfactory estimate of current volume increment per acre may be obtained directly from top height and the current height growth of the 100 largest stems per acre. The total volume production of each sample plot at each remeasurement was plotted against top height by species, quality classes and thinning grades. The species examined were Scots and Corsican Pine,

Norway and Sitka Spruce, European and Japanese Larch, and Douglas Fir. It was found that the relationship between current volume increment per acre and current height growth varies with species and with height but not (within the range of values covered by the data) with the rate of height growth (site quality) or with thinning grade. A table has accordingly been constructed which gives the average current volume increment per acre for every 1 ft. of current height growth. This table may be expected to apply to any fully stocked, even-aged stand of these species in Great Britain, provided that it is not very abnormal in its rate of growth or in the thinning treatment it has received.

810. SMITHERS, L. A. **The Dwight co-frequency principle in diameter growth analysis.** *Silv. Res. Note For. Serv. Can.* No. 91, 1949. pp. 26. 9 refs.

The author first describes various methods in use for analysing diameter-growth data, and then presents a new technique devised by Professor Dwight of the School of Forestry, Toronto. This 'co-frequency method' is so named because it describes the variation in the horizontal distances between two cumulative frequency curves showing the diameter distributions at two ages of the trees surviving to the later date. The early diameters are arranged in order of diameter at the early age, and the present diameters in sequence of the diameters at the present time. When stump analyses of sample trees measured on plots are used, only some of the horizontal separation distances between the cumulative frequency curves of the stand at the two ages, are measured. The procedure of arranging both the early and the present diameters in order of magnitude gives an entirely new relationship; this is no longer between two diameters of the same tree at different ages, but is a relationship between the early diameter of a tree which holds *a certain position* in the stand sequence at the early age and another tree whose present diameter is such that it holds *the same relative position* in the stand sequence based on the present diameters. The method of obtaining this 'co-frequency line' from two previously calculated regression lines is explained, and the application of the co-frequency principle to stand projection is illustrated by working out an example.

811. WARRACK, G., and JOERGENSEN, C. **Precision measurement of radial growth and daily radial fluctuations in Douglas Fir.** *For. Chron.* 26 (1), 1950 (52–66). 6 refs.

Reports on a 2½-year trial of the dial-gauge dendrometer [cf. *For. Abstr.* 11 (No. 761)] to evaluate the effect of thinnings, in terms of radial growth, on Douglas Fir in Cowichan Lake Forest Experiment Station, and at the same time to determine the value of the device for this purpose. The results indicate that the dial-gauge dendrometer is unnecessarily precise for the measurement of growth response to thinning, too many sample trees being required to reduce the influence of biological variation so as to match instrumental precision. It is also technically inferior to the dendrograph as a recorder of daily fluctuations in stem diameter.

The study of radial-growth response to thinnings by various methods and at various times of the year failed to give significant results in every case, owing to inadequate sampling, but the superiority of the response to a thinning done at the end of the growing season (mid-November) seems well established. The growing season of Douglas Fir in 1948 and 1949 began in the first week of April and lasted until the last week in September.

Daily radial variations other than growth, were studied on two Douglas Firs, of which one was growing in a fully stocked stand and the other in the open, throughout the growing seasons of 1948 and 1949. The fluctuations were found to be consistently smaller for the former than for the latter, but no other significant difference was apparent. A study of the degree and nature of the relationships between precipitation and daily radial fluctuation, led to the conclusion that the fluctuations were at a maximum in the middle of the dry period (July–August), and that even small amounts of rain in this period have a striking effect on them, greatly reducing radial enlargement during the night and often eliminating shrinkage during the day. Conversely, large amounts of rain during the wet season had little or no immediate effect on the fluctuation.

812. BYRAM, G. M., and DOOLITTLE, W. T. **A year of growth for a Shortleaf Pine.** *Ecology* 31 (1), 1950 (27–35). 12 refs.

From the results of a year's study of the growth of a dominant Shortleaf Pine [*P. echinata*] in a mixed Pine/hardwood stand, the

following characteristics were noted. The greatest radial growth was made during the spring, with diurnal shrinkages occurring on sunny days. This shrinkage, due to transpiration was more than regained overnight. By early summer, when soil moisture was somewhat depleted, daily growth was about one-half of that in the spring. Net growth was reversed during a short drought in July, real growth probably being masked by diurnal shrinkages. Current rainfall had only a slight effect on the spring growth rate, but a definitely positive effect on the summer growth rate. During cold weather, rainfall had little effect on diurnal changes in diameter, but temperatures below freezing point seem to exert a pronounced effect. The tree shrinks drastically during severe cold periods and expands rapidly as the temperature rises above freezing point. No satisfactory explanation can be given for this phenomenon, but several theories are discussed.

The measurements were made with a modified type of precision dendrometer.

813. BRIEGLEB, P. A. **Growth of Ponderosa Pine.** *J. For.* 48 (5), 1950 (349–52). 12 refs.

A review of recent research.

814. DILS, R. E., and ROBBINS, P. W. **Growth of a Red Pine [*Pinus resinosa*] plantation [in Michigan].** *Quart. Bull. Mich. agric. Exp. Sta.* 32 (3), 1950 (319–21). 3 refs.

815. GRENNING, V. **Queensland indigenous conifers.** Government Printer, Brisbane. [1950?] pp. 9 + 2 gphs., 1 map.

Deals briefly with distribution and regeneration of Hoop and Bunya Pines (*Araucaria cunninghamii* and *bidwilli*), Kauri Pine (*Agathis palmerstoni*) and White Cypress Pine (*Callitris glauca*), and gives a more detailed account of the rate of increment of plantation-grown Hoop Pine.

816. GANNEVAT, F. Courbes et tables de croissance. **[Curves and tables of increment.]** *Rev. for. franç.* No. 4, 1950 (223–6 + 1 gph.). 6 refs. [F.]

Includes (*a*) curves and tables of g.b.h. increment of standards [presumably Oak] in coppice with standards; (*b*) volume increment of simple coppice for 9 site qualities [also presumably Oak].

57. DEVELOPMENT AND STRUCTURE OF STANDS. YIELD

See also *For. Abstr.* 12 (Nos. 808, 810).

817. PRODAN, M. Die theoretische Bestimmung des Gleichgewichtszustandes im Plenterwalde. **[The theoretical determination of the state of equilibrium in selection forest.]** *Schweiz. Z. Forstw.* 100 (2), 1949 (81–99). 6 refs. [G.f.]

For the purpose of this study, a state of equilibrium is taken to mean a constitution such that the forest gives a constant yield of constant composition by diameter gradations, the fellings leaving the forest at the end of any period with a constitution equivalent to that at its beginning. It was found that the stem distribution corresponding to this condition depends on the course of the diameter increment in the individual diameter gradations [cf. *For. Abstr.* 9 (No. 1340)], and it is possible to determine the state of equilibrium mathematically as a function of the course of diameter increment and the diameter make-up of the annual or periodic yield. Examples of the calculations involved are given for a simplified theoretical case in which fellings are limited to the highest diameter gradation, and for a practical case in which other fellings (tending operations) are taken into account.

The information required is given with precision by the successive enumerations demanded by the *méthode du contrôle*, and if such enumerations occur regularly and the diameter interval in calipering remains unchanged, calculation of the equilibrium condition is simple. It is strongly emphasized that the stem distribution thus calculated is merely an aid in the planning or appraisal of silvicultural measures: the annual yield and the optimum stocking can only be decided according to silvicultural considerations.

818. PRODAN, M. Normalisierung des Plenterwaldes? **[Standardization of the selection forest]** *SchrReihe bad. forstl. VersAnst.* No. 7, 1949. pp. 21. 17 refs. [G.]

With the aim of instilling into German foresters the right notions about the structure of selection forest, Prodan tabulates and discusses data derived largely from his own researches [cf. *For. Abstr.* 9 (No. 1340)] and put forward as provisional standard examples of some types of Silver Fir and Silver Fir/Norway

Spruce selection forest. It is emphasized that such standard examples of the mensurational constitution of selection forest have only a relative value and a very limited sphere of application, and their compilation is justified chiefly by the need for *some* standard of reference in the early stages of selection management. It is also urged, however, that exact mathematical studies of selection forests are an essential complement to the largely intuitive silvicultural approach to selection forestry.

819. GERASIMOV, M. V. Kavkazskaya pikhta: struktura i kachestvennaya kharakteristika devstvennŷkh drevostoev. [***Abies nordmanniana*: structure and qualitative features of virgin stands.**] Gosudarstvennoe Lesotekhnicheskoe Izdatel'stvo, Moscow and Leningrad. 1948. pp. 175. 132 refs. [Russ.] Price *Roubles* 12.25. X.

See *abstr.* in *Emp. For. Rev.* 28 (2), 1949 (180–2).

820. FRASER, A. R., and ALEXANDER, J. L. **The development of the Spruce-Balsam type in the Aleza Lake experimental forest.** *Tech. Publ. B.C. For. Serv.* No. T.32, 1949. pp. 41. 13 refs.

The present virgin stands (*ca.* 80% *Picea glauca* and 20% *Abies lasiocarpa*) are producing 90 total cu. ft./acre/year, of new wood. Losses of growing stock through mortality are 94·0 cu. ft. The net loss of 4 cu. ft./acre/year is attributed to over-maturity and consequent higher susceptibility to insects and disease. All Spruce should be removed to a 13-in. d.b.h. limit and Balsam to the minimum merchantable limit (9 in. d.b.h.). The actual development of areas cut over to a diameter limit supports this proposal; 20-year-old second-growth stands are thrifty and well stocked, production being distributed as follows:—5–15% on old residual trees, 80–90% on trees that were between 1 and 12 in. d.b.h. at time of logging, and 0–10% on trees that were under 0·6 in. at time of logging or have seeded in since.

821. WATT, R. F. **Growth in understocked Western White Pine stands.** *Res. Note Nth. Rocky Mt. For. Range Exp. Sta.* No. 78, 1950. pp. 2 + 1 tbl.

A study of data from 54 sample plots which were established in the *Pinus monticola* type in Montana in 1925–6, showed that over a period of time, understocked and overstocked stands tend to approach certain central values, which, however, are not exactly those given in the *P. monticola* yield tables. Basal-area stocking tends to approach 92%, Scribner bd. ft. volume 88%, and total cu. ft. volume 98% respectively of the yield-table values, which indicates that the latter may be somewhat too high. A table is given showing the average 5-year changes that occur in stands of various original densities.

822. BOGGESS, W. R. **Thinning yields from a 13-year-old Shortleaf Pine plantation in Southern Illinois.** *For. Note Ill. agric. Exp. Sta.* No. 13, 1950. pp. 2.

823. MCARDLE, R. E., MEYER, W. H., and BRUCE, D. **The yield of Douglas Fir in the Pacific Northwest.** *Tech. Bull. U.S. Dep. Agric.* No. 201 (rev.) 1949. pp. 74 + 14 photos. 10 refs.

824. CHRISTERSON, T. Allmänna skogliga produktionstabeller. [**General forestry yield tables.**] The Author, Nora. 1948. pp. 42. 1 ref. [Sw.E.]

For well managed, frequently thinned Scots Pine and mixed Scots Pine stands of normal density, in Sweden.

6. MANAGEMENT. WORKING PLANS. SURVEYS

60. GENERAL LAND MANAGEMENT

See *For. Abstr.* 12 (Nos. 891–3).

60.3. *Management of Different Classes of Forest*

See also *For. Abstr.* 12 (No. 407).

825. GUISE, C. H. **The management of farm woodlands.** McGraw-Hill Book Co., Inc., New York. 2nd ed. (revised) 1950. pp. 356. 29 refs. Price $4.00 (32*s.*).

Cf. *For. Abstr.* 1 (pp. 308–9).

826. JAMES, N. D. G. **Notes on estate forestry.** Basil Blackwell, Oxford. 1949. pp. 75. Price 3*s.* 6*d. net.*

These notes appeared as a series of contributions to the *Journal of the Land Agents*

Society during 1947 and 1948 [cf. *For. Abstr.* 9 (No. 2202); 10 (Nos. 995, 1515, 1757, 1767, and 1814)]. They have been slightly amended and rearranged with the addition of a guide to the year's work, month by month.

827. James, N. D. G. **The farmer and his trees.** *Agriculture in Essex and Hertfordshire, London* [1949?] (37–42).

Notes on the possibilities of farm woodland in England.

828. James, L. M. **Determining forest landownership and its relation to timber management.** *J. For.* 48 (4), 1950 (257–60).

Deals with sampling technique [cf. *For. Abstr.* 11 (No. 772)], methods of rating management, questionnaires, and analysis of data.

61. SURVEYING. MAPPING

See also *For. Abstr.* 12 (Nos. 305, 805).

829. Seely, H. E. **Air photography and its application to forestry.** *For. Air Surv. Publ. For. Surv. Can.* No. 6, 1949. pp. 10. 6 refs.

Paper presented to the U.N. Scientific Conference at Lake Success.

830. Trorey, L. G. **New air survey techniques and their application to forest mapping in the Pacific Coast region.** *For. Chron.* 26 (1), 1950 (67–73).

Explains the process of compiling a base map from aerial photographs by the use of the multiplex projector, a three-dimensional photogrammetric machine.

831. Tichý, A. Plán revíru Hády, zhotovený leteckou stereofotogrammetrií. **[A plan of the Hády forest district prepared by aerial stereophotogrammetry.]** *Zpr. výzkum. Úst. lesn. ČSR* No. 2, 1948 (341–52). 3 refs. [Cz.russ.e.] [Stanice lesnické geodesie a fotogrammetrie, Brno.]

832. Hills, G. A. **The use of aerial photography in mapping soil sites.** *For. Chron.* 26 (1), 1950 (4–37). 40 refs.

The first part of this paper deals with a basic site classification designed to provide a framework for assessing the capability of any area for forest production; the second part is a discussion of mapping methods with emphasis on the use of aerial photographs.

Basic soil sites are described in terms of the moisture regime and the permeability of the soil materials and of the temperature and the evaporativity of the local atmosphere. The simple terms or symbols used to indicate sequence in the intensity or level of these three most essential characteristics are also handles for a class of forest sites which can be subdivided on the basis of any significant site feature. Though this is necessary for detailed studies, refinement is avoided as much as possible because of the overwhelming number of types. Grouping rather than subdivision is necessary for practical purposes, since there are at least 300 basic soil sites (several times this figure, in fact, if even the most important variations are considered) for each climatic region. A chart is presented in which the 121 sites (based on moisture and permeability and excluding ecoclimate), are grouped in 33 groups. An indication is given by the use of letter symbols, of the method by which these can be further grouped into 5 merchantable sites, 4 partially merchantable sites and 2 unmerchantable ones (the very dry and the very wet) making a total of 11 sites occurring within the normal or zonal ecoclimate of any one site region.

Using a knowledge gained from field studies of the relationships of moisture and permeability to various recognizable characteristics of patterns of the following: (*a*) forest cover, (*b*) land form including length and % slope, (*c*) waterways, (*d*) rock outcrop, and (*e*) land use, basic soil sites are mapped from aerial photographs by noting the coincidences of moisture and permeability classes indicated by the overlapping patterns of the above-named 'single' site characteristics. Seldom are the boundaries of the single characteristics actually marked on the photographs. It is with the aid of these invisible boundaries that the interpreter maps the integration of all site features known as 'basic soil sites'.

Though this classification would appear to be designed for local ratings of forest capabilities within a single region, it is well adapted for regional comparisons with universal application. The grid establishes 'normal' positions defined in terms of moisture, permeability, ecoclimate, etc., which are reference points for the comparison of patterns of 'climatic soil types' (e.g. podzols etc.) in two or more regions. On the other hand the system can be

used without involving the forester in complicated regional studies, though these are usually to his advantage. *From author's abstract.*

833. MOESSNER, K. E. **A stereogram for training in the use of parallax wedge.** *Sta. Notes Cent. St. For. Exp. Sta.* No. 60, 1950. pp. 2.

Beginners usually have difficulty in following the written instructions for obtaining the proper stereoscopic illusion of the wedge [cf. *For. Abstr.* 8 (Nos. 2802–4)]. This stereogram, which can be obtained through the Central States Forest Experiment Station, Columbus, Ohio, for 15 cents, was designed to help the student to see at a glance the graduated, sloping line of the wedge.

834. MOESSNER, K. E., BRUNSON, F. D., and JENSEN, C. E. **The accuracy of stand-height measurements on air photos.** *Sta. Notes Cent. St. For. Exp. Sta.* No. 59, 1950. pp. 2.

A study covering nearly 100 stands, compared the photo measurements of the average height of dominant trees with the corresponding Abney-level field measurements. The data support the belief that reasonably accurate stand-height measurements can be taken from recent, good-quality aerial photos even on as small a scale as 1 : 20,000. Mean deviations of 5–7 ft. were due in part to the error of Abney-level readings themselves, and to the variability in total height of the dominant trees. Aggregate deviations are for the most part low.

Comparison of data by kinds of photos studied, indicates that recent 9×9-in. summer-flown photos of good quality are superior to all others tested. The mean deviation increased significantly when winter-flown photos were used.

In addition, the mean height for each stand and its standard deviation were computed from the readings of 3 interpreters. This standard deviation was divided by the mean height to obtain the coefficient of variation for each stand. These coefficients were then averaged to obtain the mean coefficient of variation for a given type of photo, and the standard error of this mean was computed. The similarity between the trend of the mean coefficients of variation for photo measurements alone and the trend of the mean deviations of photos from field readings, suggests that the former may prove as reliable a measure of the relative value of aerial photos as the latter. If so, the superiority of a given scale or kind of photo could be determined from the readings of 3 or more trained interpreters without the necessity of costly field checking.

835. OBATON, F. Le pouvoir réflecteur des conifères pour le rayonnement infrarouge. **[The reflecting power of conifers towards infra-red rays.]** *C.R. Acad. Sci., Paris* 228 (11), 1949 (939–41). 2 refs. [F.] D.S.I.R.

The density of photographs of leaves of 5 species of coniferous and 4 of deciduous trees was measured by a microdensitometer. Results are tabulated and show that the coefficient of infra-red reflection varies very little between the conifers tested, and is considerably lower than that for deciduous trees. This is related to the different appearance of conifers and deciduous trees in aerial photographs.

836. SEYBOLD, A. Zur Klärung optischer Probleme der Blätter. **[Some optical problems connected with leaves.]** *Biol. Zbl.* 67 (1/2), 1948 (71–7). 9 refs. [G.g.e.f.russ.] [Botanisches Institut der Universität Heidelberg.] E.M.B.

Details and discusses some investigations into the differences in light reflection observed in needles of conifers and leaves of deciduous trees. The reflection of the individual needle is not less than that of the leaf of a deciduous tree but the arrangement of the needles is responsible for the smaller reflection of light in the mass. A greater capacity for reflection in the middle- and long-wave parts of the visible spectrum is found in yellow autumn leaves owing to their lack of chlorophyll. In the green part of the spectrum the absorption of light by green leaves is considerable.

837. COLWELL, R. N. **New technique for interpreting aerial color photography.** *J. For.* 48 (3), 1950 (204–5). [School of Forestry, University of California.]

Recent tests demonstrate that additional data of value to foresters can be obtained from colour photography in certain instances by viewing the colour transparencies through appropriate filters. The writer discusses some possible uses and invites information from any others who have experimented in this way. It is proposed to get some colour aerial photographs taken from an aircraft equipped with an

artificial source of illumination similar to the Edgerton Flash Unit, in order to increase the illumination in areas obscured from the direct rays of the sun, and so facilitate photo interpretation in these shaded areas.

62. COMMUNICATIONS

838. COURTILLOT, E.-P. L'application de la technique des radiocommunications aux exploitations forestières. [**The application of radio communications to forest operations.**] *Bois For. Trop.* No. 13, 1950 (24–35). [F.e.span.]

Discusses the advantages to be derived from radio communications in forest operations in French West Africa, Ivory Coast and Cameroun, sets out a suggested network, and discusses available types of equipment.

64. DESCRIPTION OF SITE. ASSESSMENT OF SITE AND STAND QUALITY

See also *For. Abstr.* 12 (Nos. 66–7, 158, 277, 403, 832, 842).

839. VINCENT, B. Rostlinná společenstva v lesnické praxi. [**Plant communities in forestry practice.**] *Lesn. Práce* 28 (2/3), 1949 (49–70). 17 refs. [Cz.russ.f.]

Reviews the problem of finding a simple means of estimating site quality and classifying forest sites without expensive studies of soil, meteorology etc., with special reference to the value of natural vegetation as an indicator, and proceeds to describe a study by the author on the relation between vegetation types and the volume growth of various tree species in forests near Brno. The results, which are based on stem analyses of 984 trees (main-storey trees with well developed crowns, from stands with a fairly level canopy surface) in 436 localities, are given in tables or graphs, separately for the *Asarum europaeum*, *Asperula odorata*, *Carex pilosa*, and *C. digitata* types of the *Abieto-querceto-fagetum* association, and the *Carex montana* and *Festuca ovina* types of the *Quercus robur* × *sessiliflora* association. In general there was a clear correlation between vegetation type and volume growth, the types decreasing in productivity in the order given above. Differences in the volume growth of the individual tree species (Norway Spruce, Scots Pine, Larch, Silver Fir, Beech and Oak) in the different vegetation types were also clearly expressed, and it is therefore concluded that the types concerned are a reliable means of site classification. [Cf. *For. Abstr.* 12 (Nos. 154–5).]

840. GAISER, R. N. **Relation between soil characteristics and site index of Loblolly Pine in the coastal plain region of Virginia and the Carolinas.** *J. For.* 48 (4), 1950 (271–5). 9 refs.

Site-index curves prepared for Loblolly Pine growing in the coastal-plain region of Virginia and the Carolinas were similar in shape for all topographical conditions, but mean site index was higher on land with poor, than on land with better, surface drainage. Growth of Loblolly Pine is affected by the physical characteristics of the soil down to the impermeable subsoil horizons, and by the imbibitional water value of the least permeable subsoil horizon. The effect of these soil characteristics on site quality is quantitatively described. It has been found that 3 different equations describe the regression of site index upon the depth to the least permeable subsoil horizon and the imbibitional water value of that horizon for:—(1) soils of good or imperfect surface drainage, (2) poorly drained soils with plastic subsoils, and (3) poorly drained soils with friable subsoils. Equation (2) is of the same form as (1), varying by a constant; (3) is of a different form. A practical method of applying these results in forest management is outlined. *From author's summary.*

841. AREND, J. L., and COLLINS, R. F. **A site classification for Eastern Red Cedar in the Ozarks.** *Proc. Soil Sci. Soc. Amer. 1948* 13, 1949 (510–1). L.S.

A survey of site conditions for 91 different natural stands of *Juniperus virginiana* showed depth of soil to be the most important factor on upland sites. Soil acidity within the pH range 4·7–7·8 has little effect on growth and distribution in the Ozarks. Four site classes are recommended for the region.

65. DESCRIPTION OF GROWING STOCK

See also *For. Abstr.* 12 (Nos. 818, 821).

842. FEKETE, Z. A koronaátmérő és a mellmagassági átmérő kölcsönös viszonya. [**The relationship between crown diameter and breast height diameter.**] *Erdész. Lap.* 85 (10), 1949 (234–7). [Hu.russ.g.]

The author presents tables showing the ratios existing between crown diameter and (*a*) for *Robinia pseudoacacia*, each 5-cm. diam. class and six site classes, and (*b*) for Oak, Beech and Scots Pine, mean height class (by 2-m. classes) with 7 site classes for Oak and 3 for Pine. Data for Robinia and Oak were derived from the author's own researches [cf. *For. Abstr.* 10 (No. 794)]; those for Beech and Pine from Wiedemann's yield tables.

66. YIELD REGULATION. SUSTAINED YIELD

See also *For. Abstr.* 12 (Nos. 817, 887).

843. BRASNETT, N. V. **Some problems of sustained yield management in the colonies.** *Emp. For. Rev.* 29 (1), 1950 (9–12).

Emphasizes the peculiar difficulties of ensuring sustained yield in tropical forests.

844. KLEPAC, D. Baza za određivanje etata. **[The basis of determination of yield.]** *Šum. List* 73 (5), 1949 (137–73). Many refs. [Croat.f.russ.]

Klepac claims that the subdivision of forests into the conventional felling series is not entirely satisfactory for modern forest management planning. Developments such as the integration of forest ownership and improved methods of transport allow planning to be based on whole forest regions that form permanent economic entities, not only from the forestry but also from the general economic standpoint. In Jugoslavia the conventional felling series should continue to apply only to forests managed by local public bodies for a given sustained yield of wood (chiefly firewood) for local consumption, in quantities depending upon local conditions. For the rest, i.e. the forests managed by the state Services, which are either (*a*) regular high forest or (*b*) selection high forest, the author envisages a different management structure. In (*a*) the possible yield could be determined on the principle of working from the large unit to the small, i.e. by means of 'computational management series' (felling series) comprising all stands of broadly the same forest type and productivity class within a forest region. This, he claims, would reduce the subjective factor and also keep the basis for silvicultural planning distinct from the basis on which management is planned. Each computational series would have to have its own working scheme within the framework of the regional working plan, and allocation of possible yields should be permitted only between closely related series and only within one and the same forest region. For general management and silvicultural purposes, 'silvicultural management series' would also be formed from self-contained forest units having similar site conditions (regardless of species or rotation). In such a series it would be necessary to apply the same principles of general management and silviculture regardless of considerations of normality or sustained yield. A regional working plan would be drawn up, embracing all the 'computational' series of a forest region and distributing the total possible principal yield over the 'silvicultural' series, taking all economic, exploitational and silvicultural factors into consideration. Intermediate yields would have to be determined for each operational series separately, principally by area.

In (*b*), felling series should, as a rule, be self-contained and of similar soil and climatic characteristics. Since, however, it is unnecessary to secure a sustained yield from a single series, the possible yield can be distributed among a set of series in one region; but this can be done efficiently only by combining a determination of the possible yield from the large unit (felling series basis) to the small, with one from the small unit (compartment basis) to the large.

845. BAUER, S. Matériel sur pied, accroissement, et possibilité. **[Growing stock, increment, and annual yield.]** *Schweiz. Z. Forstw.* 100 (9), 1949 (408–14). [F.g.]

Presents a new formula for calculating the annual yield during a period of adjustment, viz. $V_n = V_1\ (1{\cdot}0x)^n$ and hence $\log 1{\cdot}0x = \frac{1}{n} \cdot \log \frac{V_n}{V_1}$, where V_1 is the present growing stock, V_n the desired growing stock obtained after n years, and $x = p - q$ (increment % minus annual yield in % of present growing stock). Values of V_n/V_1, n, and x are tabulated and given in curves, so that x can be read off directly and then subtracted from p to give q. In the case given above $V_1 < V_n$: if $V_1 > V_n$, the formula will read $\log 1{\cdot}0x_1 = \frac{1}{n} \cdot \log \frac{V_1}{V_n}$. Procedure is

similar except that $x_1 = q - p$ and therefore q is found as $p + x_1$. Examples are given.

846. FONTANA, E. Reglas generales para el establecimiento de la ordenación en los bosques altos tropicales 'tropófilos y ombrófilos pluviales'. **[General principles for drawing up a plan of management in tropical tropophilous and rain forests.]** Comité Organizador, Tercera Conferencia Interamericana de Agricultura, Caracas. 1945. pp. 61. 4 refs. [Span.span.]

Outlines a plan for the conversion of virgin forest to regular normal high forest by the periodic-block method.

67. WORKING PLANS

847. RYLE, G. B. **The plan of operations.** *Quart. J. For.* 44 (2), 1950 (58–74).

The plan of operations as laid down by the Forestry Commission for dedicated estates, comprises an abbreviated form of working plan to provide basic information and control, as the state will have a direct interest in the principles of management of private woods whereon public funds will be payable. It is not intended to cover the detailed silvicultural control, which is primarily a matter for the estate owner or his technical agent. An accurate knowledge and record of the woodlands as they exist at the date of compilation of the plan is the fundamental requisite, and the preparation of the plan from this foundation is described. A simple method of maintaining forest records is recommended. A 'model' plan of operations, designed to elucidate common problems, is appended, together with the cursive compartment notes from which it has been constructed. *Author's summary.*

7. FOREST ECONOMICS, VALUATION, AND FINANCE

See also *For. Abstr.* 12 (Nos. 5, 309–10, 408, 434–5, 635, 653, 661, 667–8).

848. ŠVEC, J. Lesní ekonomika v socialistickém pojetí. **[Forest economics in the socialist sense.]** *Lesn. Práce* 28 (6/7), 1949 (249–74). [Cz.russ.e.]

Examines relations between capital, production value and surplus value in forestry from the Marxist point of view, finding a basic agreement, or under certain conditions, identity, of the equations developed with the equations of classical forest economics, in spite of the radically different approach to the conceptions involved. It further appears from the author's analysis that although the use of interest is not permitted in the Marxist equations, yet there appears to be no objection, even from a socialist point of view, to the owner of the means of production charging interest within certain limits and making use of compound-interest calculations.

849. RIEDER, P. Der Waldwert im Enteignungsrecht. **[Value of the forest in relation to the [Swiss] law of expropriation.]** *Schweiz. Z. Forstw.* 101 (4), 1950 (148–61). 9 refs. [G.g.]

Briefly explains the Swiss law in connexion with compulsory acquisition of forest land for building etc., and discusses the factors to be taken into account in calculating compensation, including inconvenience to the owner, cost of planting a new area, possible injury to remaining stand by windthrow, etc.

850. HILEY, W. E. **An examination of the accounts for the year 1947–48.** Dartington Woodlands Ltd., Totnes. [1949?]. pp. 13.

An analysis made to elucidate the commercial aspects of such schemes. A loss for the year was kept low, only because of profits from a forest nursery and from Christmas-tree plantations.

8. FOREST ADMINISTRATION

81. ORGANIZATION. STAFF

851. **Proposed code of ethics for the Canadian Society of Forest Engineers.** *Special Supplement* to *For. Chron.* March, 1950 (85–8).

852. TAYLOR, J. E. **Note on origin and working of statistical section in conservator's office, Nairobi, Kenya.** *Emp. For. Rev.* 29 (1), 1950 (56–7).

853. Distribución de los servicios y del personal técnico del D.F. **[Organization of the services and personnel of the Forest**

Department [of Ecuador].] *Circ. Dep. for. Ecuador* No. 11–DF, 1950. pp. [3]. [Span.]
Shown in a chart.

854. RAUTVUORI, E. Metsänhoitajanimityksestä vieraissa kielissä. [**On the title 'forester' in different languages.**] *Metsät. Aikak.* 1949 (6/7), (217–20). [Fi.e.]

82. LABOUR QUESTIONS

See also *For. Abstr.* 12 (Nos. 415–20, 433, 878).

855. SILVERSIDES, C. R. **Applying work simplification to woods operations in Eastern Canada.**—With comments by A. Herrgen. *Woodl. Sect. Index Pulp Pap. Res. Inst. Can.* No. 1031 (*A*–2–*a*), in *Proc. Woodl. Sect. Canad. Pulp Pap. Ass. 1949*, 1950 (78–89).

856. ARO, P. Työajan jaottelu metsätöissä. [**Work analyses in forestry.**] *Julk., Metsäteho, Helsinki* No. 1, 1945 (34–8). [Fi.]
Includes some comparative terminology in German, Russian and Swedish.

857. KARVONEN, M. Työfysiologiset havainnot ja tutkimukset valtakunnan hakkuumestaruuskilpailuissa 15–20.10.1945. [**Physiological observations on Finland's lumber competition 15–20.10.1945.**] *Julk., Metsäteho, Helsinki* No. 2, 1947 (34–44). 25 refs. [Fi.e.]

858. KARVONEN, M., and KUNNAS, M. Havaintoja suomen parhaiden metsätyöntekijöiden iästä ja ruumiinrakenteesta. [**On the age and constitutional type of the best Finnish logging workers.**] *Julk., Metsäteho, Helsinki* No. 2, 1947 (45–51). 13 refs. [Fi.e.]

859. KANTAOLA, M. Hakkuumiesten ikäsuteet ja iän vaikutus metsänhakkuutyökalujen kuntoon. [**Lumbermen's ages and the influence of age on the suitability of timber-cutting tools.**] *Metsät. Aikak.* 1949 (3/4), (106, 109). [Fi.]
The statistics are based on material collected by the Ministry of Communications and Public Works in 1946–47 and 1947–48 in six districts. The 3,321 men employed in the former year and 2,180 in the latter are divided into 5-year age classes. 59% were under 30 and 40% under 25. Other data, given graphically and in tables, show a definite relationship between age classes and years spent in lumbering. Many boys of 12–13 start by accompanying their fathers and doing light work at first, but this involves the risk of overstrain and of their attempting work before becoming proficient. They should be taught the rudiments of forest work and safe practice during their schooldays.
If the men had been constantly employed from the time of starting their calling, those of 60 would have begun at 29, those of 40 at 23, those of 30 at 19 and those of 20 at 16 years. The average starting age is 19. The war has had some influence on these figures, but its extent cannot be gauged.
Attempts were made to determine the suitability of tools for various age classes. Saws, for example, have been found more suitable for middle-aged than younger men, and after 50 their suitability decreases steadily. Particular attention should be paid to improving the tools of the younger men, for they are the most liable to overstrain themselves.

860. VÖRY, J. Metsätyöläisten elinkustannuksista talvella 1946. [**Forest workers' cost of living in winter 1946.**] *Julk., Metsäteho, Helsinki* No. 3, 1947. pp. 40. [Fi.]
A detailed study, with much tabulated data and diagrams, and divided into the following main sections:—forest workers' budget (fellers and hauliers); their food; other items of personal expenditure (clothing, drink, tobacco, work tools etc.); horse upkeep; value of working capital and its depreciation; income, expenditure and changes in working capital; effect of excessive prices on workers' monthly budget.

861. FIŠMAN, V. Naše lesní dělnictvo. (Výsledky sociologického výzkumu). [**The forestry workers of Czechoslovakia. (Results of a sociological study).**] *Lesn. Práce* 28 (4/5), 1949 (171–227). [Cz.russ.e.]
Reports on a study, undertaken in view of the serious shortage of forest labour, by the Sociological Section of the Czechoslovakian Institute of Labour in 1948–49, covering: (1) The forest labour force and its replenishment; turnover of labour; absenteeism; attitude of settlers towards forestry work. (2) The main social characteristics of forestry workers—age, education, social origin, duration of employment in forestry etc. (3) Reasons for the unpopularity of forestry work.

862. KOZDERA, J. Odborný výcvik lesních pracovníků v Československé republice. **[Vocational training of forest workers in Czechoslovakia.]** *Lesn. Práce* 28 (6/7), 1949 (274–87). [Cz.russ.e.]

Discusses the necessity of and possible measures to secure proper vocational training for Czechoslovakian forest workers, against the background of the post-war labour shortage and the consequent need for mechanization and rationalization, recruitment of a competent labour force, and the provision of alternative activities for the off season.

863. SHIRLEY, H. L. **Employment and unemployment in forestry [: an analysis of conditions in the U.S.A.]** *Paper Tr. J.* 129 (6), 1949 (18–20, 22). 17 refs. P.R.

864. MENIAUD, J. L'insuffisance de la main-d'oeuvre en A.E.F. et l'importation de travailleurs nigériens. **[The shortage of labour in French Equatorial Africa and the introduction of Nigerian workers.]** *Bois For. Trop.* No. 13, 1950 (1–3). [F.e.span.]

In order to make up the local deficiency of labour, the Forestry Syndicate of Gabon has prepared a plan for the immigration of Nigerian workers, as has already been done in Spanish Guinea.

865. **Forest workers in New Zealand.** *Unasylva* 4 (1), 1950 (7–9).

9. FOREST POLICY

90. GENERAL PRINCIPLES OF FOREST POLICY

See also *For. Abstr.* 12 (Nos. 13, 23, 45).

866. SCHENCK, C. A. **Forestry in Germany, present and prospective.** Newsprint Service Bureau, 342 Madison Avenue, New York 17. 1948. pp. 42.

867. **Government of Cyprus: a statement of forest policy.** Government Printing Office, Nicosia. 1950. pp. 8. Price 1*s*.

868. **[Sudan Government] statement of forest policy and the Forest Ordinances 1939, with extracts from Section (10) of the Local Government (Rural Areas) Ordinance 1937.** *Sudan Government, Khartoum.* [1949]. pp. 82. [E.Arab.]

Includes amending orders up to 1949.

869. Le problème forestier du Québec. **[The forest problem of Quebec.]** Éditions Fides, 25 est, Rue St.-Jacques, Montreal. 1949. pp. 114. [F.] [Association des Ingénieurs Forestiers du Québec.]

870. OLIVEIRA, A. PEIXOTO DE. Exploração racional de essências florestais em Pernambuco. **[Rational exploitation of forest species in Pernambuco.]** *Bol. Ser. Agric. Ind. Com., Pernambuco* 16 (1/2), 1949 (91–108 + 3 plates). [Port.]

Reviews some of the problems facing the Pernambuco Forest Conservation Service in the way of regulating fellings, controlling burnings and charcoal manufacture, and promoting reforestation.

91. SOCIAL AND ECONOMIC INFLUENCE OF THE FOREST. NATIONAL PARKS. RESERVES. FOREST INFLUENCES

871. KEENLEYSIDE, H. L. **The place of the forest industry in the Canadian economy.** University of British Columbia. 1950. pp. 16.

The H. R. MacMillan Lecture in Forestry for 1950, delivered by the Deputy Minister of Resources and Development.

91.1. *Rural Preservation. Reserves. National Parks. Plant and Animal Protection*

See also *For. Abstr.* 12 (Nos. 739–40).

872. **Britain's forests: Rheola.** H.M. Forestry Commission, London. 1950. pp. 17.

873. MIKOLA, P. **Plan for new nature conservation areas.** *Metsät. Aikak.* 1949 (6/7), (191–3). [E.]

874. RANDHAWA, M. S. **Nature conservation, national parks and bio-aesthetic planning in India.** *Indian Fmg.* 10 (6–7), 1949 (271–7; 311–6). O.R.E.

Discusses the need for national parks in India, and suggests some suitable trees for

planting in towns and villages and along highways.

875. ROONWAL, M. L. **Preservation of wild-life in Indian forests—a plea for national parks.** *Indian For.* 76 (2), 1950 (63–6 + 4 drawings). 8 refs.

For the purposes of this article, India, Pakistan, Ceylon, Burma and Nepal are treated as a single unit.

876. ROBYNS, W. Atlas général du Congo: Les parcs nationaux et les réserves du Congo belge et du Ruanda-Urundi. **[General atlas of the Congo: the national parks and reserves of the Belgian Congo and of Ruanda-Urundi.]** Institut Royal Colonial Belge, Brussels. 1948. pp. 9 + 9 + map. [F.Flem.]

Cf. *For. Abstr.* 12 (Nos. 146, 164).

91.3. *Influences of the Forest on the Environment*

See *For. Abstr.* 12 (Nos. 48–9, 55–6, 74, 319, 323).

91.4. *The Forest in Hygiene and Recreation*

877. PARKE, W. N. **Recent experiments in administering and charging for camping and picnicking privileges on the national forests.** *J. For.* 48 (4), 1950 (275–7).

91.5. *Value of the Forest for Colonization*

878. YATAGAI, M., and KOSAKI, T. **Studies in forest colonization in Hokkaido. (I). Project for establishing a national forest community at Jushosanko. (II). Forestry village planning at Tokachimitsumata.** *Res. Bull. exp. For. Hokkaido Univ.* 14 (1; 2), 1948 (47–77; 163–85). [Jap.]

The general considerations underlying the author's scheme, including existing forest conditions, are discussed and the substance of the scheme—housing, work and administration of the communities to be introduced—is outlined with sketch maps and plans. The significance of the project for national forestry and social policy is also discussed.

91.7. *The Forest as a Source of Raw Materials*

879. HESKE, F. Der Tropenwald als Rohstoffquelle Europas. **[Tropical forests as a source of raw material for Europe.]** *Z. Weltforstw.* 12 (4/6), 1948 (61–90). 267 refs. [G.f.e.]

880. COLLINS, W. B. **The forest and the fisherman.** *Emp. For. Rev.* 29 (1), 1950 (48–50).

A short account of the forest products necessary for equipping the Gold Coast fishing industry.

92. FOREST LAW

See also *For. Abstr.* 12 (Nos. 5–6, 682, 849, 868).

881. HAO, C. **Forest laws.** Department of Agriculture, Sun Yat Sen National University, Canton. 1949. pp. 190. [Chin.]

An elementary treatise on the principles of forest laws, with special reference to Chinese forest law. A comprehensive appendix includes the text of the Chinese Forest Law as amended to Feb. 1945, logging regulations, and details of the various research and administrative branches of the forestry department.

882. **A law further to amend the Goat Laws, 1913–1937, 15th October, 1948.** *Statute Laws of Cyprus* No. 32, 1948. pp. 2. *Suppl. No. 2 to Cyprus Gazette* No. 3399, Oct. 21, 1948. O.R.H.

883. MOELLER, A. L'évolution de la législation forestière au Congo belge. **[The evolution of forest legislation in the Belgian Congo.]** *Bulletin des Séances de l'Institut Royal Colonial Belge, Brussels* 20 (2), 1949 (443–77). [F.] L.S.

94. FOREST OWNERSHIP. CO-OPERATIVES

See also *For. Abstr.* 12 (Nos. 828, 849).

884. PEKKALA, M. Valtion metsätalous. **[State forestry.]** *Metsät. Aikak.* No. 11, 1949 (367–8). [Fi.e.]

Reviews the origin of the Finnish state forests and their present position.

885. LAPPI-SEPPÄLÄ, M. Voimaperäisen metsätalouden mahdollisuuksista valtion metsissä. **[On the prospects of intensive**

forestry in state forests.] *Metsät. Aikak.* No. 11, 1949 (369–70). [Fi.e.]

About 34% of the Finnish forests are state-owned, but 88% of the state forests are situated in the more inaccessible Northern regions, and are generally mature and overmature. The author stresses the importance of improving and developing communications by land and water, and of permanent housing, as an essential preliminary to proper management.

886. WHITE, H. G. **Forest ownership research in historical perspective.** *J. For.* 48 (4), 1950 (261–4). 19 refs.

A brief historical review of forest ownership in the U.S.A.

887. **Information concerning Shelton [, Washington,] cooperative sustained yield unit and cooperative agreement.** U.S. For. Serv. 1946. pp. 25.

Cf. *For. Abstr.* 9 (No. 1984).

888. BARRACLOUGH, S., and RETTIE, J. C. **The ownership of small private forest-land holdings in 23 New England towns.** *Sta. Pap. Ntheast. For. Exp. Sta.* No. 34, 1950. pp. 32.

95. FOREST TAXATION

889. **Income tax and death duties on woodlands.** *Leafl. For. Comm., Lond.* No. 12 (rev.) 1949. pp. 10. Price 2*d.*

96. POLICY REGARDING PROTECTION FOREST, DEFORESTATION AND AFFORESTATION

890. **Forests and man.** *Nature, Lond.* 164 (4173), 1949 (687–8).

Summary of 5 papers under this title read during the British Association meeting in Newcastle on Sept. 5 at a combined meeting of the Botany and Forestry sections. The earlier papers were chiefly concerned with history and prehistory of British forests and the later ones with the need for forest conservation.

97. POLICY REGARDING THE RELATION OF THE FOREST TO AGRICULTURE, PASTURE, AND INDUSTRY

See also *For. Abstr.* 12 (Nos. 80, 177).

891. CLAWSON, M. **The western range livestock industry.** McGraw-Hill Book Co., Inc., New York, Toronto, London. 1950. pp. xiii + 401. Refs. as footnotes. Price $5.00 (£2. 2*s.* 6*d.*).

Includes a brief account of Forest Service ownership (p. 96) and the administration (pp. 110–18; grazing fees pp. 261–3) of grazed land; open forest is rated a major forage type.

892. Atti del Congresso nazionale della Montagna e del Bosco: Firenze 4–8 Maggio 1947. [**Proceedings of the national conference on mountains and forest: Florence 4–8 May 1947.**] *Accademia economico-agraria dei Georgofili, Firenze* 1947. pp. 591. [It.]

The conference considered various aspects (agricultural, hydrographical, legal, social, economic etc.) of land use in mountain regions of Italy. Amongst the papers read at the conference and here reprinted, are the following:—'Woodland and timber production in economics and legislation' (*F. Salvatore*); 'Woodland and timber production in Italian forest economy' (*A. Giacobbe*); 'Industry and trade in timber and other forest products' (*G. Giordano*); 'General survey of the forestry problem' (*A. Pavari*).

893. **Forestry and hill farming.** *Nature, Lond.* 164 (4172), 1949 (640–1).

Report on a joint discussion by the Forestry and Agriculture sections of the British Association.

FORESTRY THE WORLD OVER

References: 1. *Annual Report of the Department of Forests*, Jerusalem. 1a. *Bois et Forêts des Tropiques*, Paris. 2. *Crown Colonist*, London. 3. *Foreign Commerce Weekly*, Washington. 4. *Forest Treasures*, Nicosia. 5. *Holz-Zentralblatt*, Stuttgart. 6. *India News*, London. 7. *Indian Forester*, Lahore. 8. *Italia forestale e montana*, Florence. 9. *Journal of Forestry*, Washington. 10. *Journal of the Land Agents' Society*, London. 11. *Mundo Maderero*, Buenos Aires. 12. *Pedology*, Moscow. 13. *Quarterly Journal of Forestry*, London. 14. *Report on Forest Research, Forestry Commission*, London. 15. *Timber Trades Journal*, London. 16. *Timberman*, Portland, Ore. 17. *Times*, London. 18. *Wood*, Chicago. 19. *Wood Notes, Northeastern Wood Utilization Council*, New Haven.

Conferences. A Marine-borer Conference was held at Wilmington, N.C., 5-6 June. Discussions were held on borer-resistant timbers, creosoting etc.

The F.A.O. European Commission on Forestry and Forest Products opened its 3rd session at Geneva on 28 August. Representatives from 13 European countries and an observer for the Commonwealth Agricultural Bureaux attended the session. The International Labour Office and the International Union of Forest Research Organizations were also represented. The session was to examine progress reports on national forest policies submitted by member governments, and a draft statement of forestry principles which, when amended, will be submitted to the next conference of F.A.O. for adoption as an official statement of principles to be applied in forestry (28.8.1950).

Bermuda. The Director of Agriculture has stated that £1,262,000 will have to be spent on reforestation because of the infestation which has destroyed most of the colony's Cedar trees. Of that amount £1,000,000 will have to be spent on clearing 500,000 dead Cedars (2; April 1950).

Borneo. The Colonial Office have given the British Borneo Timber Co., Ltd., notice to terminate, on 30 June 1955, the concession under which for 30 years they have enjoyed virtually exclusive rights to the timber on all State lands in British North Borneo. The present concession was inherited by H.M. Government when the Crown took over the British North Borneo Chartered Company (2; April 1950).

Brazil. A factory for extracting tannin from Black Wattle is being set up in São Leopoldo, Rio Grande do Sul, Brazil. This is the first factory of its kind to be established in S. America (11; March 1950).

Cyprus. One of the most far-reaching experiments ever undertaken in Cyprus is now nearing completion. It is the uprooting and removal of an entire village—the village of Dhimmata. The old village was in the heart of Paphos Forest, a community of goat graziers living in squalid, one-roomed shacks shared with their animals. The new village, which is being built by the Forest Department, is on the northern coast, with ten times as much land as the old, well planned houses, a school, and a coffee shop. When goat grazing was forbidden in the southern forests, the livelihood of the people of Dhimmata was taken away, and it was decided to transplant them, building a village outside the forest, with ample land for irrigated agriculture. The total cost is about £1,000 per family, of which the Government finds two-thirds and the rest is being met from a long-term loan made by the Government (4; Summer 1950).

Germany. 'Cyanex', a new preparation for bleaching blue-stained wood, has been formulated by the Allgemeine Holzimprägnierung G.m.b.H., Rooseveltstr. 12, Bad Kissingen (5; 18.5.50).

Great Britain. Of the old Yew tree at High Lorton, William Wordsworth wrote:—

'The pride of Lorton Vale . . .
This solitary tree, a living thing,
Produced too slowly ever to decay;
Of form and aspect too magnificent
To be destroyed'.

It will not be destroyed, for the Ministry of Town and Country Planning has confirmed a preservation order which effectively safeguards it. Another famous tree which was recently made the subject of a tree preservation order is the old Oak tree by Newbells Farm, Haughley, in East Suffolk. This tree is reputed to be more than 1,000 years old. Its circumference at the base is 53 ft., and at a height of 3 ft. 6 in. it has a girth of 34 ft. (**10**; June 1950).

A good deal of natural regeneration of forest trees has been appearing among the ruins of bombed buildings in London. The commonest species are native trees with light wind-dispersed seeds, such as Birch and Willow, but on at least one site, near the junction of Southampton Row and Theobald Street, there may be seen examples of two exotic species, *Platanus acerifolia* and *Ailanthus altissima*, which are reproducing themselves from self-sown seed. The nearest mother trees are 60 yards away. Some of the Planes are 15 ft. and the *Ailanthus* 10 ft. high. All the trees appear to be of the same age and there are no younger examples following on, which suggests that these species ripen viable seed in London only in an exceptional season (**13**; July 1950).

As a by-product of a cockchafer investigation, 6,000 chafer grubs parasitized by the tachinid fly *Dexia* have been sent by air to other countries for the control of allied species of white grub; 2,000 of these parasitized larvae were supplied to the U.S. Bureau of Entomology, and 4,000 to Mauritius (**14**; 1949).

William Mallinson & Sons Ltd., timber importers and merchants, now have their own nursery at Calford near Bury St. Edmunds as part of a scheme for offering a felling, clearing, and replanting service to estate owners. The nursery now covers 8½ acres. Each area, as it was cleared, was deep ploughed and either cropped with potatoes or green cropped. A successful method of raising Oak seedlings has been developed: acorns are sown in December, 4 in. deep, and in early March 2 in. of soil are raked off. An overhead watering system has been installed; the water is pumped from a 140-ft. borehole into two 1,000-gal. storage tanks where it is brought to air temperature before spraying on to the beds (**15**; 1.7.50).

Greece. The custom of planting Cypress trees on the birth of a child to a farmer's family is practised all over the Peloponnesus. On the birth of a boy or girl, the farmer plants a few Cypress saplings around his farm, or turns a bit of his land into a small Cypress grove. In 20 years' time the trees will be big enough to help the farmer provide a dowry for his daughter, or higher education for his son (**4**; Summer 1950).

India. The Indian Government has instituted a new festival called 'Vana Mahotsav' (festival of trees), which will be celebrated throughout India in the first week of July when the monsoon sets in over the greater part of the country. The ceremonial planting of trees will be done in all suitable places, particularly in compounds of Government buildings, court houses, rest houses, camping grounds, private bungalows, public gardens, burial grounds, and other open spaces, by the sides of canals, roads and railways, in college and school compounds, and on village wastelands (**6**; 17.6.50).

The engineering staff of the Bengal-Nagpur Railway is planting trees at the rate of 24/mile in an attempt to win the Government of India's prize for the best planter in the State (**6**; 15.7.50).

Bamboos of the Paniali block, Kotdwara Range, U.P., are now gregariously flowering over an area of 315 acres and it is expected that in the remaining compartments they may flower during the next two years. This confirms the prediction of the recent working plan of this division. They flowered last in 1909-10, which gives a flowering cycle of 40 years and agrees with the old observations about this species (**7**; May 1950).

International. The Inter-African Information Bureau for Soil Conservation and Use has just been opened at 47 Rue Cuvier, Paris V^{e}. This is one of the permanent scientific bureaux and committees set up jointly by Belgium, Great Britain, France, Portugal and the Union of South Africa for technical co-operation in Africa south of the Sahara (**1a**; April-June 1950).

Israel. The far Negev is included in the afforestation programme of the Department of Forests. A plan has been drawn up to survey the desert and conduct experimental research in Waadi Araba. A small experimental nursery has been started. A vegetation map is to be prepared after determining

the ecological conditions, especially the amounts of salts and water in the soil, typical of each plant association. The water 'supply' of each of the main plant associations is to be examined (**1**; 1949-50).

Nigeria. The Colonial Development Corporation announces the formation of the Omo Sawmills of Nigeria Ltd. This is a subsidiary company in which the Corporation is associated with a well-known firm of shippers of high-grade West African hardwoods, a group of African business men, and a large British firm of timber importers. A large area of the Omo Forest Reserve, at present held under licence by the timber shippers and business men mentioned above, will be operated as a single unit. In addition to carrying on logging operations, the company plans to erect a modern sawmill in the concession area. Both home and export markets will be served, and the new company's export policy will be progressively to increase shipments in the form of sawn timber (**15**; 17.6.50).

A report issued on the first 3 months' operation of the optional timber inspection scheme [cf. *For. Abstr.* 11 (p. 425)] indicates that the results have been very satisfactory. It has been necessary to train timber inspectors, and these have been recruited from experienced produce examiners of the Dept. of Marketing and Exports, who were already familiar with the principles of Government inspection. In order to assist small shippers in preparing an export shipment, pre-inspection is carried out at the shipper's request before the logs are rafted, regardless of whether the consignment is subject to final inspection on board ship or not (**15**; 15.4.50).

N. Rhodesia. Coal has been discovered at Neganega, Northern Rhodesia, less than 2 miles from the railway south of Kafue. The quantity and value of the deposit are now being assessed. The discovery of workable coal in Northern Rhodesia would bring coal to within 280 miles of the copper mines, instead of the 630 miles from the Wankie mines, and would stop the costly wood-cutting and burning now necessary. Rhodesia's rail transport difficulties would also be much relieved. (**17**; 26.8.50).

Pakistan. Pakistan's first creosoting plant has been installed in Haripurbad near Waziribad, Punjab. It has a capacity to treat 300,000 sleepers annually. Equipment for another plant is under construction (**3**; 24.7.50).

Poland. Poland's first sawdust briquette factory began operation in Jan. 1950. A simple invention which employs inexpensive equipment and no chemicals is used in the manufacture of the briquettes. Sawdust is heated under pressure and blends into a compact product which is said to be harder than ordinary wood. The briquettes burn well and give much heat, even with only a very small admixture of timber and coal. The briquettes are said to make excellent fuel for gas-producer engines (**3**; 24.7.50).

Sweden. A new method of seasoning is being used at the sawmill at Kasket near Gävle. This 'centrifugal' seasoning, which is applied only to planks cut from the outside of a log, is said to cut the seasoning time by 50%. The planks are loaded on a trolley and subjected to a temperature of 32° C. One trolley load at a time is then introduced into the centrifuge, which consists of a fixed concrete cylinder containing a rotating platform. The trolley is fixed to the platform and rotated for 4 hours at a rate of 58 rotations per minute. The moisture content is thus reduced from 55 to *ca.* 35%. From a charge of 11·5 cu.m., more than 1,000 kg. of water are eliminated. From the centrifuge the wood is transferred to an air tunnel with a temperature of 40° C. (**8**; March–April 1950).

U.S.A. Experimental pruning in the snow was practised for the 3rd winter in the Collins Almanor Forest in northern California. Four of the forestry staff, who are occupied in cruising, marking etc. in the summer, were employed in live-pruning young crop trees in the forest. More than 3,000 acres of selectively logged timber have been treated in this way. Snow-shoes are necessary, as some of the work is done on 4 ft. of snow. The men work in pairs. One uses a pick handle to beat off dead branches and a short-handled saw to cut the lower limbs. The other uses a long-handled pruning saw to reach up to 18 ft. on the tree. The cut limbs are scattered away from the base of the tree to reduce fire hazard. There are usually only 3 or 4 trees per acre suitable for pruning (**16**; May 1950).

The Armstrong Forestry Co. of Johnsonburg, Pa., has developed a practical method of applying chemicals to trees to be cut for pulpwood, so as to make peeling possible at any season of the year.

During the spring, when the sap is rising, the trees selected for removal are girdled and brushed with a weak solution of sodium arsenate. A gallon of the poison, costing about $1.00, is enough to treat 30-50 cords or 300-500 trees. An experienced man can girdle and treat 20 cords or more per day, making the total cost 40-60 cents/cord. Three months after treatment, the Pines, Oak, and Aspen peel very readily; Beech and Maple take nearly a year. After proper seasoning, the tops and branches dry out so that they shatter when the trees are felled. Enough bark may fall off to make peeling a light operation. There is no harmful effect on wild life, and no danger to the operator if he handles the poison with care and washes his hands after using it. Apparently the trees that are killed do not sprout from the stump. The dead trees are subject to a certain amount of insect and fungus attack (**19**; July 1950).

More than 75 aeroplanes, operated from 15 airports, took part in a co-operative attack on Spruce budworm in Oregon in June. A million acres of forest were sprayed at a rate of 1 lb. DDT/gal. fuel oil/acre. The State of Oregon pays half the cost of spraying on private lands, the private operators one-quarter, and federal government one-quarter (**9**; July 1950).

The TVA has tested a method of estimating depletion from stump counts, on the regular forest inventory plots in two areas. Results were so satisfactory that studies in refinement of the technique were initiated, and the U.S. Forest Service has adopted the method for trial in 4 regions of the country. If large-scale tests confirm the earlier results, the adoption of this method would effect a large saving in cost and at the same time obtain better data (**9**; July 1950).

A portable moisture meter (the Tag Midget, weighing 4 lb.), for the quick determination of the moisture content of wood and plaster, has been developed by Weston Electrical Instrument Corp., Newark, N.J. (**18**; Aug. 1950).

Dr. J. H. Kraemer of Purdue University has perfected a new type of parquet flooring, called Hardi-floor, which is constructed from laminated end-grain blocks made from sawmill waste. The high resistance to abrasion of the end grain makes for greater durability and less cleaning and maintenance. A rubber-based mastic is used to lay the flooring units without any nailing or fitting (**16**; June 1950).

U.S.S.R. The U.S.S.R. Academy of Sciences is organizing an expedition, under the leadership of V. N. Sukachev, to study the problems involved in the shelterbelt and afforestation scheme in the steppe and forest-steppe regions. The study group is charged with: (1) the development of improved techniques of establishing such plantations; (2) the development of improved general silvicultural and management techniques for such plantations; and (3) the investigation of the natural conditions of the various sites as the basis of the operations necessary to put the scheme into effect. For items (1) and (2) there will be two field-station teams—a northern team for the chernozem zone, and a southern for the zone of chestnut earths and related soil types. The teams will include foresters, geobotanists, soil scientists, hydrologists, climatologists, microbiologists, agronomists etc., and a wide variety of both short- and long-term investigations, embracing both existing plantations and those still to be created, is envisaged. Apart from the detailed studies to be made of conditions as they now exist, the main lines of future research will be: (*a*) research on silvicultural and management methods, and (*b*) research on the effects of the plantations on the environment and agriculture therein (studies of effects on climate and microclimate, the water regime, erosion, phenological changes, changes in the physiological balance of wild and cultivated plants, effects on fauna, and effects on crop yields) (**12**; Dec. 1949).